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Emergency



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Version 5.3

Corrected, Updated, Lighter

PLAB 1 Keys is for **PLAB-1** and **UKMLA-AKT** (Based on the New MLA Content-Map)

With the Most Recent Recalls and the UK Guidelines

ATTENTION: This file will be updated online on our website frequently!

(Example: **Version 2.6** is more recent than **Version 2.5**, and so on)

Key
1

Hypoglycemia [blood glucose < 4 mmol/L]

Hypoglycemia

→ [Blood glucose < 4 mmol/L] + tachycardia, sweating, confusion, shaking... etc.

◆ Causes of Hypoglycemia:

- ✓ Excess antidiabetic agents (e.g., insulin, gliclazide) especially if skipped meals.
- ✓ Excess Alcohol.
- ✓ Liver failure (impaired gluconeogenesis).
- ✓ Excess paracetamol, aspirin, sulphonylureas (e.g., glibenclamide, gliclazide).
- ✓ Others: Insulinoma, Addison's, self-administration of insulin/sulphonylureas.

◆ Manifestations of Hypoglycemia:

Tachycardia,

Pounding heart,

Hunger,

Anxiety,

Sweating,

Confusion,

Altered mentation,

Coma

◆ Management of Hypoglycemia (**Important**):

Can swallow = can tolerate orally, not vomiting.

● If **Conscious** and **Can swallow** (can tolerate orally)

→ give **200 ml fruit juice** Or **Oral glucose gel**.

● If **Unconscious** OR **Conscious but Cannot swallow**

→ **IV Glucose** (In case of **IV access** is already put).

OR **IM or SC glucagon 1 mg (2 tubes)** (In case of **IV line** is **not** available or **not** put yet or difficult to put as in patients who are having **seizure/ convulsions**).

Bear in mind that unconscious is different from confused.

● In-Hospital Management of Hypoglycemia (Summary):

- If the patient is confused but able to swallow → **glucose gel** (can be squeezed into the mouth between the teeth and gums).
- If the patient is confused and unable to swallow → **IM glucagon** or if there is already an IV line then give IV glucose.

Sometimes, a question will not tell you if the patient is able to swallow or not. However, you may find in the stem that the patient has been vomiting. Thus, he cannot swallow (cannot tolerate orally).

Examples of Used Concentrations (Important):

IV Glucose		
Over 10 minutes	75 ml of 20% glucose	150 ml of 10% glucose
Over 15 minutes	100 ml of 20% glucose	200 ml of 10% glucose
Every 1-2 minutes	50 ml of 10% solution given every 1-2 minutes until patient is conscious or 250 ml has been given (5 times repetitions).	

Important notes

✓ **Glucagon is ineffective with alcohol-related hypoglycemia. So, if the cause of hypoglycemia is alcohol → insert IV access and administer IV glucose.**

✓ *Oral glucose gel should never be used in unconscious patients because of the fear of choking.*

Quick Scenarios

(Asked Previously)

- **Quick Scenario (1):**

A patient with hypoglycemia who is drowsy, sweaty, tachycardic and confused cannot tolerate orally and keeps vomiting. IV access is not put yet.

→ **IM or SC glucagon 1mg.** (*Confused + Unable to swallow + No IV line*)

- **Quick Scenario (2):**

Unresponsive Hypoglycemic + Does not have IV access + Having seizure.

→ **IM or SC glucagon 1mg.**

(He is having seizure; it would be difficult to gain IV access)

(He is unresponsive → cannot swallow of course → glucose gel cannot be given).

- **Quick Scenario (3):**

Conscious but with altered mentation and confusion (aware of his diagnosis) + Hypoglycemic + Does not have IV access + The cause of his hypoglycemia is profound alcohol intake.

We **cannot** give glucagon as he is alcoholic; the liver is already busy metabolizing the alcohol. (Conscious “even if drowsy” + able to swallow → glucose gel)

→ **Oral glucose gel** (He is conscious + there is no mention of inability to swallow).

- **Quick Scenario (4):**

A young man was found on the garden floor unconscious. His HR is 100. His capillary blood glucose is 1.2. He smells of alcohol. He does not have IV line.

We **cannot** give glucagon as he is alcoholic; the liver is already busy metabolizing the alcohol.

Remember: Glucagon is ineffective with alcohol-related hypoglycemia.

He is unconscious (unresponsive) → unable to swallow → No glucose gel.

→ **IV glucose.** **Eg, insert IV and administer 75 ml of 20% Glucose**

- **Quick Scenario (5):**

Diabetic patient suddenly collapsed and fell unconscious

First step → measure **Random Blood Glucose**.

If blood sugar is **below 4** → It is **hypoglycemia** (tachycardia, sweating, confusion, altered mentation).

Key
2

Burns

Pathophysiology of severe burns (Reading)

Following burn, there is a local response with progressive tissue loss and release of inflammatory cytokines. Systemically, there are cardiovascular effects resulting from fluid loss and sequestration of fluid into the third space.

There is a marked catabolic response.

Immunosuppression is common with large burns and bacterial translocation from the gut lumen is a recognised event.

Sepsis is a common cause of death following major burns.

Assessing the extent of the burn

Wallace's Rule of Nines:

head + neck together = 9%,

each full arm = 9%,

each anterior part of leg = 9%,

each posterior part of leg = 9%,

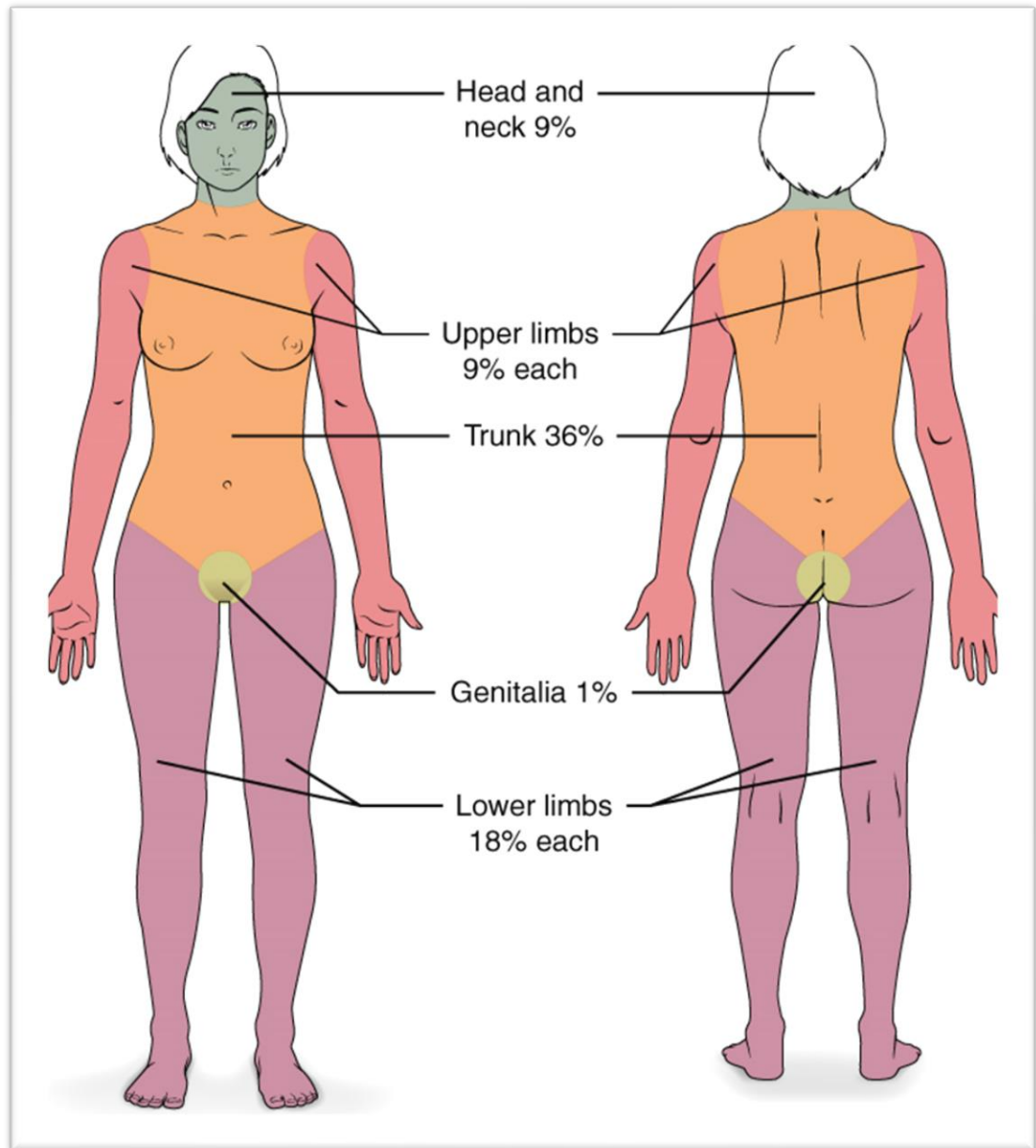
anterior chest = 9%,

posterior chest = 9%,

anterior abdomen = 9%,

posterior abdomen = 9%,

Perineum = 1%

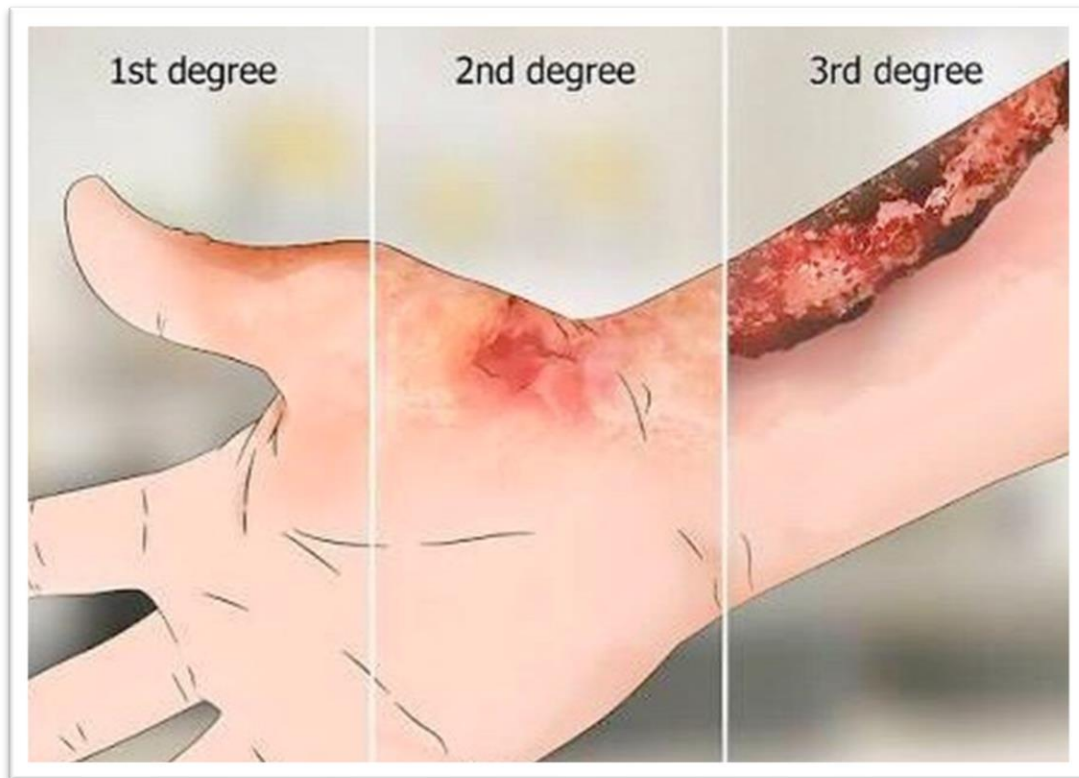


- **Lund and Browder chart: the most accurate method**

- the **palmar surface** is roughly equivalent to **1%** of total body surface area (TBSA). Not accurate for burns > 15% TBSA

Assessing the depth of the burn (The Degrees of the Burn)

New terminology	Old terminology	Appearance
Superficial epidermal	First degree	Red and painful
Partial thickness (superficial dermal)	Second degree	Pale pink, painful, blistered
Partial thickness (deep dermal)	Second degree	Typically, white but may have patches of non-blanching erythema. Reduced sensation
Full thickness	Third degree	White/brown/or black in colour, no blisters, no pain



2nd Degree Burn –superficial partial thickness



- Redness with clear Blisters.
- Painful, moist burn.
- Blanches with pressure.
- Don't be in a hurry to break the blisters.
- Heals in 14-21 days
- Blisters provide biologic dressing and comfort.
- Once blisters break, red raw surface will be very painful.



Full Thickness Burn



Immediate first aid management

- Airway, breathing, circulation (ABC).
- Non-adherent clothing should be removed as soon as possible
- **Burns caused by heat (Thermal)** → remove the person from the source of heat. Within 20 minutes of the injury, irrigate the burn with cool (not iced) water for between 10 and 30 minutes. Cover the burn using cling film, layered, rather than wrapped around a limb.
- **Electrical burns** → switch off power supply, remove the person from the source.
- **Chemical burns** → brush any powder off then irrigate with water for about 1 hour. Attempts to neutralise the chemical are **not** recommended.

Referral to secondary care is done in the following cases

- All full-thickness burns.
- Deep dermal of > 5% in adults, and all deep dermal burns in children.
- Superficial dermal burns involving the **face, hands, feet, perineum, genitalia**, or any flexure, or **circumferential** burns of the **limbs, torso, or neck**.
- Any **inhalation** injury.
- Any **electrical** or **chemical** burn injury.
- Suspicion of **non-accidental** injury.

Initial management of burns

- Initial first aid measures as mentioned above.
- Review referral criteria.
- **Superficial epidermal** → symptomatic relief – **analgesia**, **emollient**.
- **Superficial dermal** → cleanse wound, **leave blister intact**, **avoid topical creams**, apply **non-adherent dressing**, review in 24 hours.

[**Example**] Superficial Burn of an arm in adults (=9%) (still below 15%) and the pain is first degree. What to do after first aid measures?

→ **Apply wound dressing, bandage, analgesia as needed and discharge.**

Management of more severe burns

[The initial aim is to stop the burning process and resuscitate the patient].

- **Intravenous fluids** will be required for **children with burns greater than 10%** of total body surface area. **Adults** with burns **greater than 15%** of total body surface area will also require IV fluids.
- The fluids are calculated using the **Parkland formula** which is:

volume of fluid in ml =

total body surface area of the burn (%) X weight (Kg) X 4. The result is in **ml**.

- **Half** of the fluid is administered in the **first 8 hours**.
- A urinary catheter should be inserted.
- Analgesia should be given.
- Complex burns → burns involving the **hand, perineum, face** should be transferred to a **burn's unit**.
- **Circumferential burns** affecting a limb or **severe torso** burns impeding respiration may require **escharotomy** to divide the burnt tissue.
- **Important:**
- **Full thickness circumferential burns** affecting a limb **can cause compartment syndrome (severe pain + absent or reduced pulse + paraesthesia)** → **Urgent Escharotomy** is needed to relieve the pressure.
- **Crushing injury** causing compartment syndrome (e.g., a heavy concrete fell on a limb for a long time that has led to loss of circulation and a resultant compartment syndrome) → **Urgent Fasciotomy** is needed to relieve the pressure and restore the circulation.

- So: full thickness circumferential burns that led to compartment syndrome → **Urgent escharotomy**.
- Crushing injury that has led to compartment syndrome → **Urgent fasciotomy**.
- Conservative management is appropriate for superficial burns and mixed superficial burns that will heal in 2 weeks. More complex burns may require excision and skin grafting.
- Excision and primary closure are not generally practised as there is a high risk of infection.
- There is no evidence to support the use of anti-microbial prophylaxis or topical antibiotics in burn patients.

Escharotomies

- Indicated in **circumferential full thickness burns to the torso or limbs**.

- Careful division of the encasing band of burn tissue will potentially improve ventilation (if the burn involves the torso), or relieve compartment syndrome and oedema (where a limb is involved)

Fluid resuscitation formula

Parkland formula

(Crystalloid only e.g. Hartman's solution/Ringers' lactate)

Total fluid requirement in 24 hours (in **ml** not in L) =

4 ml X total burn surface area (%) X body weight (kg) = ml fluids.

- 50% given in first 8 hours
- 50% given in next 16 hours

Resuscitation endpoint: Urine output of 0.5-1.0 ml/kg/hour in adults (increase rate of fluid to achieve this)

Points to note:

- Starting point of resuscitation is the **time of injury**.
- Deduct fluids already given.

▣ **An important summary:**

◆ **A child with partial thickness burn:**

√ > 5% → refer to a burn unit.

√ > 10% → start IV fluid treatment + refer.

◆ **An adult with partial thickness burn:**

√ > 10% → refer to a burn unit.

√ > 15% → start IV fluid treatment + refer.

Key
3

Paracetamol overdose (Poisoning):

Risk factors

The following groups of patients are at an increased risk of developing hepatotoxicity following a paracetamol overdose:

- Patients taking **liver enzyme-inducing drugs** (e.g. **rifampicin**, **phenytoin**, **carbamazepine**, **chronic alcohol intake**)

- **Malnourished patients** (e.g. anorexia or bulimia, cystic fibrosis, hepatitis C, alcoholism, HIV).
- Patients who have **not eaten** for a few days

Management

All patients are treated the same regardless of risk factors of hepatotoxicity.

On Admission

→ FBC, U&E, LFT, INR, Blood gases, Glucose,

+ **Serum paracetamol level at 4 hours** Post-ingestion (NOT POST-ADMISSION).

± Give IV acetylcysteine if there is an indication (see below).

IV N-Acetylcysteine should be given in any of the following:

- ✓ There is a **staggered overdose** (all tablets were not taken within 1 hour).
Eg, ingestion of 6 gram (12 tablets) each day for 5 days. This is an overdose.
- ✓ There is **doubt over the time** of paracetamol ingestion, **regardless** of the plasma paracetamol concentration.

✓ Patients present **> 8 hours** after ingestion.

✓ **Jaundice** or **liver tenderness**.

✓ The Patient is **unconscious** or have a suspected overdose.

✓ The 4-hour post ingestion **plasma paracetamol concentration** is **on** or **above the treatment line** regardless of risk factors of hepatotoxicity.

■ **N.B.** If a patient presents after ingesting **30 tablets** of paracetamol but **without** any other indications for initiating N-Acetylcysteine. What to do?

→ Measure the **paracetamol levels at 4 hours post-ingestion** (Calculated from the time of ingestion, not the time of hospital arrival) before commencing N-Acetylcysteine.

■ **N.B.** If the Serum paracetamol level is **normal**?

→ **Refer to psychiatric liaison**. *These are nurses who trained to receive mental health referrals from A&E. They can decide whether the patient is mentally safe to be discharged or they need further psychiatric admission and treatment.*

(This is because **no Medical treatment is required**. The referral to psychiatry aims at preventing recurrent attempts of suicide and treating any possible psychological abnormalities).

HOWEVER, if there are symptoms or the patient needs to be treated (eg, by N-acetylcysteine), this should be dealt with by the **“medical” team**. After discharge from medicine → refer to **psychiatry**.

Notes:

- N-Acetylcysteine is given as an IV infusion.
- U&E, LFT, Venous blood gas, INR should be repeated post-treatment.
- Hypersensitivity is not a contraindication to treatment with N-Acetylcysteine.
- Treat all patients (both those on liver enzyme inducing drugs or those who are not on these drugs) similarly.
- The critical dose is **150mg/kg in 24 hours**
(Approximately for adults **24 tablets** = **12 grams**).
- If presents > **8 hrs** after ingestion of a significant dose of paracetamol
→ **Commence N-acetylcysteine (NAC) infusion.**
- **Oral activated charcoal** is given **1g/kg (Max: 50 g)** if the patient presents **within 1 hour** after ingesting **≥ 150mg/kg** paracetamol.
- **Paracetamol poisoning is dealt with in the medical ward not in the psychiatric.** However, after a discharge from medical ward has been made, a referral to psychiatric team is usually made.

Q) What is the maximum dose of paracetamol per day for adults?

Remember that each paracetamol tablet contains 500 mg.

The maximum daily dose of paracetamol is:

→ 4 gram/day = 8 tablets per day = 2 tablets every 6 hours.

If someone is taking 2 tablets (ie, 1 gram) every 6 hours, the total daily dose (in 24 hours) will be 8 tablets (ie, 4 gram).

Example

A 70-year-old man has been taking paracetamol to control his back pain. He has been taking 12 tablets (ie, 6 grams) of paracetamol every day for the last 5 days. His liver enzymes are elevated. The last taken dose was 15 hours ago. His paracetamol serum level is 15 mg/L. What is the most appropriate action?

→ Start N-acetylcysteine intravenously.

- This is **staggered overdose** (which requires N-acetylcysteine infusion).
- Also, the **paracetamol serum level is high**. Read the following:

✓ All patients with plasma paracetamol level ≥ 100 mg/L at **4 hours** after ingestion should receive acetylcysteine regardless of risk factors.

✓ All patients with plasma paracetamol level ≥ 15 mg/L at **15 hours** after ingestion should receive acetylcysteine regardless of risk factors.

✓ Where there is doubt over the timing of paracetamol ingestion including when ingestion has occurred over a period of one hour or more – ‘staggered overdose’ – acetylcysteine should be given without delay.

✓ Administer the initial dose of acetylcysteine as an infusion over 60 minutes to minimise the risk of common dose-related adverse reactions.

✓ Hypersensitivity is no longer a contraindication to treatment with acetylcysteine.

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When to refer a patient with paracetamol overdose for Liver Transplantation? (Imp)

King's College Hospital criteria for **liver transplantation** (**Paracetamol Liver Failure**)

☐ Arterial pH **< 7.3**, **24 hours** after ingestion

☐ Or **all** of the following:

- Prothrombin time (**PT**) **> 100** seconds +
- **Creatinine > 300** µmol/l +
- Grade **III** or **IV encephalopathy**

Hepatic encephalopathy type	Manifestations
I	Changes in behavior, mild confusion, slurred speech, disordered sleep
II	Lethargy, moderate confusion
III	Marked confusion (stupor), incoherent speech, sleeping but arousable
IV	Coma, unresponsive to pain

Remember,

After **24 hours** of paracetamol ingestion, a pH of **< 7.3** is an indication for **liver transplant!**

Key
4

Important Notes on burns:

The IV fluid resuscitation (fluid replacement) is required in burn **only if**:

- ☐ **> 10%** of the total body surface area is burned in **Children**.
- ☐ **> 15%** of the total body surface area is burned in **Adult**.

HOWEVER,

Complex burns → burns involving the **hand, perineum, face** and burns **>10% in adults** and **>5% in children** should be transferred to a **burn's unit** (Special burn services).

Example:

A 2-year old child presents with 6% partial thickness burn on his chest

→ **No need for IV treatment.**

If it was >10% (in children) or >15% (in adults) → give IV fluids.

Key 5	<p>☐ Breathlessness and Stridor in a child playing with toys is commonly seen due to Aspiration of a FB</p> <p>Next Step? → Indirect Laryngoscopy ± Fibre optic examination of the pharynx</p> <p>☐ N.B. It is most commonly seen in children from 6 months to 5 years old.</p> <p>☐ If (<u>Direct</u> Laryngoscopy) was given instead of “Indirect”, Pick it.</p> <p>Magill’s forceps is used under direct laryngoscopy.</p>
Key 6	<p>Opioid Overdose → Give IV Naloxone (Fast onset, Short duration)</p> <p>☐ Given IV at 0.8 mg.</p> <p>☐ It has short duration of action, starts working after 2 minutes (Rapid Onset of action), can be <u>repeated every 2-3 minutes</u> if minimal or no response <i>“Naloxone has a shorter half-life compared to methadone”</i>.</p> <p>☐ Features of Opioid Overdose</p> <ul style="list-style-type: none"> - Symmetrical bilateral MIOSIS “constricted pin-point pupils”. - Respiratory depression. - Bradycardia. - Altered level of consciousness. <p>In other words, → Low RR, Low BP, Low HR, Pinpoint constricted pupils</p>

Key
7

A patient with wide superficial epidermal burn involving nearly his whole left arm comes to A&E. No blisters. Only redness and pain.

This is a first degree (Superficial Epidermal) burn as there is only **redness** and **pain** WITHOUT Blisters which are characteristic for 2nd degree (Superficial dermal) burns.

Involving one arm = 9% → (i.e. superficial, <15% → No IV fluid is indicated)

Superficial epidermal burns < 15% of the TBSA in adults:

- Give **Analgesia**, **Apply non-adherent dressing and bandage and discharge.**
- Check his tetanus status and give tetanus toxoid if required.
- F/U in an outpatient clinic twice a week for inspection.

Note, if no improvement in 2-3 weeks → refer to 2ry care unit or burn clinic.

When to give IV fluid (Parkland formula)?

If the TBSA burnt is > 15% in adults and > 10% in children.

■ **Complex burns** → burns involving the **hand, perineum, face** and burns >10% in adults and >5% in children should be transferred to a **burn's unit**.

When to refer to 2ry care?

- All **full-thickness** burns.
- **Deep dermal** burns of **more than 5% TBSA** in **adults**, and all deep dermal burns in children.
- superficial dermal burns involving the **face, hands, feet, perineum, genitalia**, or any flexure, or **circumferential** burns of the **limbs, torso**, or **neck**
- any **inhalation** injury
- any **electrical** or **chemical** burn injury
- suspicion of non-accidental injury

Key
8

Head injury: NICE guidance on investigation (CT Head)

CT head **immediately** (within 1 hour) if any of the following:

1. **GCS < 13** on **initial** assessment. "GCS = Glasgow Coma Scale".
2. **GCS < 15** at **2 hours** post-injury.
3. Suspected **open** or **depressed** skull fracture.
4. Any sign of **basal skull fracture** (*Hemotympanum, 'panda' eyes, cerebrospinal fluid leakage from the ear or nose, Battle's sign*).
5. Post-traumatic **seizure**.
6. Focal neurological deficit.
7. **> 1** episode of **vomiting**.

Basilar Skull Fracture



hemotympanum



Battle's sign



Raccoon eyes

CT head scan *within 8 hours of the head injury*

- For adults with any of the following risk factors who have experienced **some loss of consciousness or amnesia** “a partial or total memory loss” **since the injury**:

- \geq **65 years**.
- Any **history** of **bleeding** or **clotting disorders** or **being on warfarin**.
- **Dangerous mechanism of injury** (a pedestrian or cyclist struck by a motor vehicle, an occupant ejected from a motor vehicle, or a fall from a height of greater than 1 metre or 5 stairs).
- More than 30 minutes **retrograde amnesia** of events immediately before the head injury. (He cannot remember the events before the injury)

If a patient is on **warfarin**, and has sustained a head injury with **no other indications** for a CT head scan

→ **perform a CT head scan *within 8 hours of the injury***.

Being on warfarin is a risk factor for intracranial bleeding. In absence of the 7 immediate CT indications mentioned above, do head CT scan within 8 hours.

Example:

A factory worker was hit on his head by a heavy automatic machine. He says that he cannot remember the cause that has led to his injury. However, he did not lose consciousness and did not vomit.

→ **Retrograde Amnesia + Dangerous mechanism of injury**

→ **Perform CT Head within 8 hours.**

Important to calculate: {GCS: Glasgow Coma Scale}

Glasgow Coma Scale		
Response	Scale	Score
Eye Opening Response	Eyes open spontaneously	4 Points
	Eyes open to verbal command, speech, or shout	3 Points
	Eyes open to pain (not applied to face)	2 Points
	No eye opening	1 Point
Verbal Response	Oriented	5 Points
	Confused conversation, but able to answer questions	4 Points
	Inappropriate responses, words discernible	3 Points
	Incomprehensible sounds or speech	2 Points
	No verbal response	1 Point
Motor Response	Obeys commands for movement	6 Points
	Purposeful movement to painful stimulus	5 Points
	Withdraws from pain	4 Points
	Abnormal (spastic) flexion, decorticate posture	3 Points
	Extensor (rigid) response, decerebrate posture	2 Points
	No motor response	1 Point
Minor Brain Injury = 13-15 points; Moderate Brain Injury = 9-12 points; Severe Brain Injury = 3-8 points		

GLASGOW COMA SCALE (GCS)

SCORE

3-8

9-12

13-15

SEVERITY

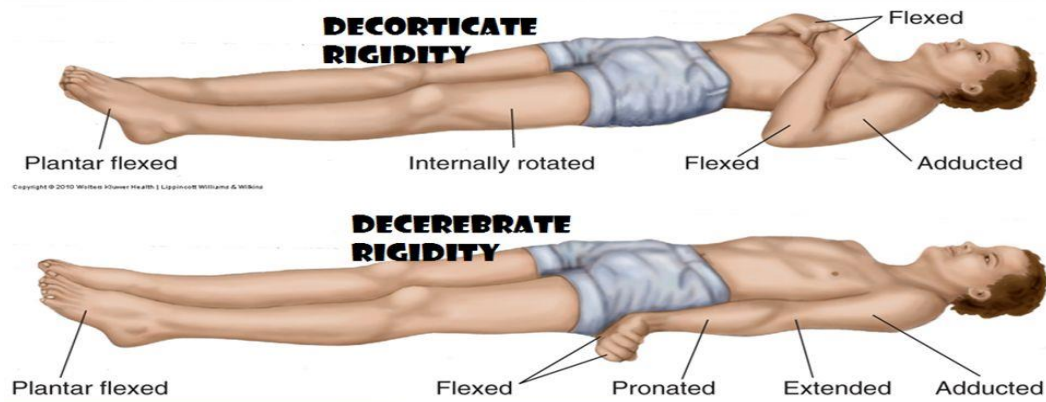
SEVERE

MODERATE

MILD

Remember that $GCS \leq 8$ is an indication of Intubation. Imp v

Decorticate and Decerebrate Posturing



Careful: You might be given a scenario and asked to calculate the GCS in the Exam.

■ **For children, do CT scan of the head within 1 hour of the injury if any of the following:**

- ✓ Seizure after the accident.
- ✓ GCS < 14 (on initial assessment).
- ✓ GCS < 15 (after 2 hours of the injury).
- ✓ Any sign of basal skull fracture.
- ✓ Suspected depressed or open skull fracture or tense fontanelle.
- ✓ Focal neurological deficit.

■ **For children, do CT scan of the head within 1 hour of the injury if ≥ TWO of the following risk factors:**

- ✓ Loss of consciousness for ≥ 5 minutes.
- ✓ Amnesia (loss of memory) for ≥ 5 minutes.
- ✓ ≥ 3 episodes of vomiting.
- ✓ Fall from a height of > 3 metres.
- ✓ Road traffic accident of a high speed.
- ✓ Abnormal drowsiness.

Important Q1)

What if a child presents with only one of these risk factors:

e.g. A boy fell from his bicycle and lost memory for > 5 minutes. He also had lost his consciousness for a few seconds.

→ **Observe for at least 4 hours after the injury.**

Only one risk factor (amnesia > 5 minutes).

Note that losing consciousness for a few seconds does not count as a risk factor. Losing consciousness for > 5 minutes counts.

Important Q2)

e.g. A boy fell from his bicycle and lost memory for > 5 minutes. He also had 3 discrete episodes of vomiting.

→ **CT scan of the head within 1 hour.**

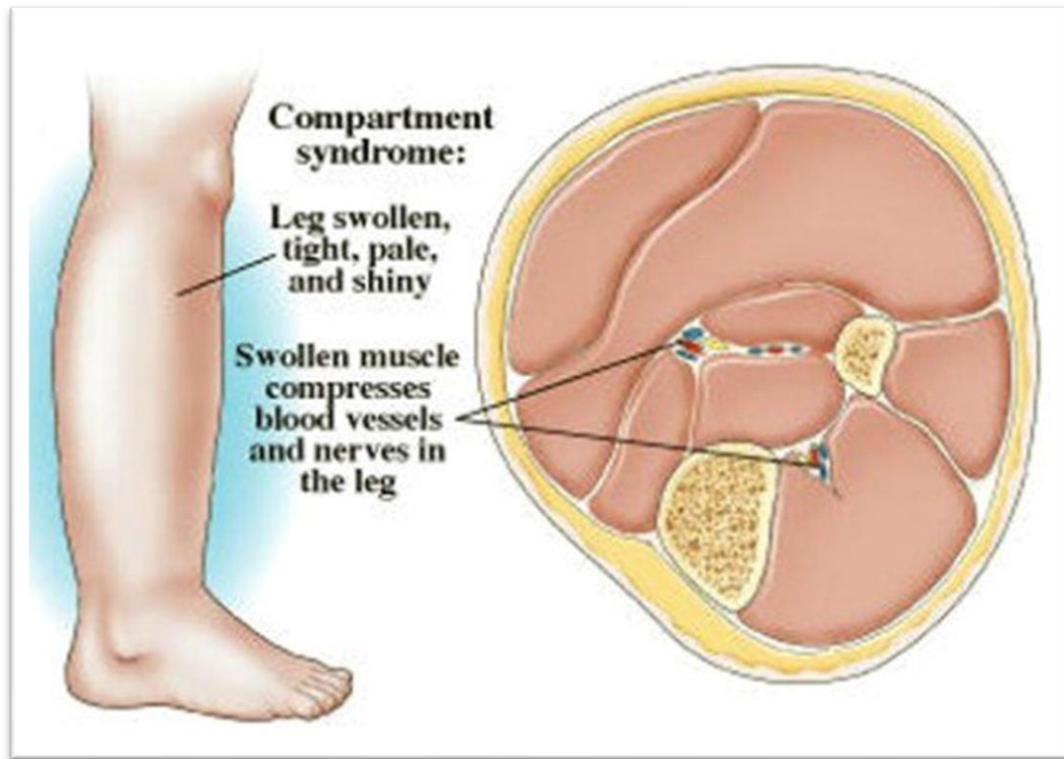
2 risk factors (amnesia > 5 minutes + 3 episodes of vomiting).

Key
9

Compartment Syndrome

- It is painful and potentially serious condition caused by bleeding or swelling within an enclosed bundle of muscles.

- **Examples:** It can occur after a traumatic injury (e.g. car crush), Prolonged compression (a limb stuck under a heavy object).
- This leads to severely high pressure within the compartment, leading to insufficient blood supply to the muscles and nerves.
- N.B. The presence of **pulse** on the affected limb **does not** exclude compartment syndrome.
- Acute compartment syndrome is a **medical emergency** that requires surgery (**Fasciotomy**) to be corrected.
- If untreated, lack of blood supply can result in a permanent damage to the muscles and nerves; thus, loss of function of the affected limb.
- N.B. **Myoglobinuria** may result **after fasciotomy** which may lead to **renal failure**. Therefore, **aggressive IV fluid** is required if myoglobinuria develops.
- N.B. Death of muscle group may result within **4 to 6 hours**.



Key
10

A child presents with scald (hot water burn) on his right arm and hand that causes partial thickness burn.

→ **Refer to a burn's unit**

One Full Arm = 9% of the TBSA.

What if it was Deep Dermal?

→ In children, **all burns that are Deep Dermal or Full Thickness should be referred to a specialised burn's unit** regardless of the TBSA being burnt.

→ In adults, **Deep Dermal burns of > 5% and All Full Thickness burns should be referred to a specialised burn's unit.**

What if it was Superficial Epidermal (First Degree)?

→ **Analgesia + Non-adherent Dressing + Discharge** with F/U in Outpatient clinic twice a week.

→ **IV fluid only if >15% in adults or >10% in children.**

- In burns, always check the **tetanus status** of the victim and give tetanus toxoid if required.

Key
11

Anaphylaxis

Anaphylaxis may be defined as a severe, life-threatening, generalised or systemic hypersensitivity reaction.

☐ **Common identified causes of anaphylaxis**

- **Food** (e.g., **nuts**) – the most common cause in children
- **Drugs** (e.g., **Penicillin** → Amoxicillin, Co-Amoxiclav)
- **Venom** (e.g., wasp, bee **sting**)

■ Symptoms of anaphylaxis

Usually involve more than one part of the body such as the **skin, mouth, eyes, lungs, heart, gut, and brain**. Some symptoms include:

- Skin rashes, itching and hives (Urticarial rash).
- Swelling of the lips, tongue or throat.
- Shortness of breath, trouble breathing, wheezing (whistling sound during breathing), Cough, Cyanosis.
- Dizziness and/or fainting.
- Stomach pain, vomiting or diarrhea.

■ Management of anaphylaxis

✓ ABC.

✓ High flow O₂.

✓ Make the patient lay flat.

✓ IM adrenaline (epinephrine) in the anterolateral aspect of the middle third of the thigh.

(In a hypotensive patient, give **IM adrenaline** first followed by IV fluids).

Anaphylaxis is one of the few times when you would not have time to look up the dose of a medication. **Adrenaline** (**epinephrine**) is by far the most important drug in anaphylaxis and should be given as soon as possible.

The recommended doses for **adrenaline**, **hydrocortisone** and **chlorphenamine** are as follows:

Age	IM Adrenaline (Epinephrine)	Hydrocortisone	Chlorphenamine
< 6 months	150 micrograms (0.15ml 1 in 1,000)	25 mg	250 micrograms/kg
6 months – 6 years	150 micrograms (0.15ml 1 in 1,000)	50 mg	2.5 mg
6-12 years	300 micrograms (0.3ml 1 in 1,000)	100 mg	5 mg
Adult and child > 12 years	500 micrograms (0.5ml 1 in 1,000)	200 mg	10 mg

♠ Adrenaline can be repeated **every 5 minutes** if necessary.

♠ The best site for **IM** injection is

→ the **anterolateral aspect of the middle third of the thigh**.

♠ After giving Adrenaline, give Hydrocortisone and Chlorpheniramine.

Note: **Adrenaline is ALWAYS given IM; Intramuscularly.**

☐ Management following stabilisation

- Patients who have had emergency treatment for anaphylaxis should be **observed for 6–12 hours** from the onset of symptoms, as it is known that biphasic reactions can occur in up to 20% of patients
- sometimes it can be difficult to establish whether a patient had a true episode of anaphylaxis. **Serum tryptase** levels are sometimes taken in such patients as they remain elevated for up to 12 hours following an acute episode of anaphylaxis.

If there is only allergic reaction (rash only), with no difficulty of breathing → This is an allergic reaction, not anaphylaxis.

→ Give oral antihistamine (eg, oral chlorpheniramine).

Antihistamine first (either oral or IV) followed by IV hydrocortisone.

Key
12

Panic Attacks

- Periods of intense fear characterised by:
palpitations, sweating, tremors, SOB that develop **rapidly**.
- It peaks around **10 minutes** and then gradually resolves over the next **20 minutes**.
- The Usual Manifestations: **Dizziness, circumoral paraesthesia and tingling, carpopedal spasm** ± sharp or stabbing chest pain.

- **The Extreme Manifestations:** a patient feels that he is **going to die** from cardiac or respiratory problems. (*sudden severe sharp stabbing chest pain that may mimic MI*)!

- Patients are usually **tachycardic** (\uparrow HR) and **tachypnic** (\uparrow RR).

- **Why tingling?**

Hyperventilation \rightarrow washout of CO_2 \rightarrow Respiratory Alkalosis \rightarrow Hypocalcemia (Low Ionic Ca^{++}) \rightarrow Tingling

- It is important to rule out the secondary causes of tachycardia, chest pain or SOB. Thus, investigations such as ECG, O₂ Saturation, Blood glucose are important initial investigations.
- FBC, KFT, CXR are required if symptoms do not settle in a few minutes.

☐ **Management of Panic Attacks:**

✓ **Simple breathing exercise such as breathing through nose, paper bag, slowing down breathing + Reassurance** is all that is needed.

✓ **Other lines, in severe and acute (still ongoing):**

\rightarrow **Benzodiazepines + Propranolol** (if no Asthma; as beta blockers are contraindicated in asthma).

Panic Disorder Management simplified:

✓ Rx **before** attack (to help in an upcoming event) \rightarrow **Propranolol** (Beta-blocker).

✓ Rx **during** attack → First line: **Rebreathe into a paper bag**.

If still? → **Benzodiazepines**

✓ **Long-term general** Rx and to prevent further attacks

→ 1st: Psychological → **CBT**. “Cognitive Behavioural Therapy”.

→ 2nd: Medical → **SSRIs**. “Selective Serotonin Reuptake inhibitors e.g. Citalopram, Fluoxetine, Sertraline”.

Key
13

Diaphragmatic rupture (injury, tear)

- Usually occurs due to a blunt trauma e.g. a **car accident**.

The seat belt compression → sudden and quick rise in the intra-abdominal pressure → burst injury of the diaphragm. (Commonly on the left side).

- **S&S: Chest and Abdominal Pain, Respiratory Distress, Diminished breath sounds** on the affected side, Bowel sound might be heard.
- **Diagnosis:**
 - **CXR (initial)** → Unreliable (low sensitivity and specificity). However, sometimes the **curled NGT “Nasogastric tube”** in the stomach is seen **in the chest** (**Pathognomonic**). Air-fluid levels in the chest.
 - **Thoracoabdominal CT Scan** → Usually **Diagnostic**.

Key 14	<p>Very Important:</p> <p>Intubate and Ventilate any patient with GCS ≤ 8</p> <p>Other possible answer → Inform the anaesthetist.</p> <p>Do not rush and pick something else!</p>
Key 15	<p>Wernicke's encephalopathy (Thiamine deficiency)</p> <ul style="list-style-type: none"> • In Chronic Alcoholics mainly. • Other causes: Persistent vomiting, Stomach Cancer. • <u>Triad of CAS:</u> <ul style="list-style-type: none"> - Confusion - Ataxia (Uncoordinated gait, unsteadiness) - Squint (Nystagmus, or Ophthalmoplegia) • Rx → Urgent IV Thiamine (Vitamin B1) even <u>before glucose replacement.</u>

- **If not treated** → It might develop to **Wernicke's Korsakoff Syndrome** = (The above triad + Retrograde Amnesia + Confabulation).

Confabulation = the patient makes up stories to replace the forgotten details (he is not lying; he thinks that these stories have truly occurred).

They may carry on a coherent conversation, but moments later, they cannot remember that they had a conversation.

Key
16

Examples of Drugs Overdose:

Paracetamol	<p>Antipyretic and Analgesic.</p> <ul style="list-style-type: none"> • First 24 hours → Asymptomatic. • After 24 hours → Acute liver failure (Very high ALT and AST) • ALT and PT usually peak at 72 to 96 hours.
Aspirin	<p>A potent Antiplatelet, Antipyretic, Analgesic and Anti-inflammatory drug.</p> <p>✓ The earliest symptoms of acute aspirin poisoning may include ringing in the ears (tinnitus) and impaired hearing.</p>

	<p>✓ More clinically significant signs and symptoms may include rapid breathing (hyperventilation), Nausea, vomiting, dehydration, fever, double vision, and feeling faint.</p> <p><i>(early: respiratory alkalosis. Late: Metabolic Acidosis)</i></p>
Amitriptyline	<p>TCA (Tricyclic Antidepressant)</p> <p>Overdose → Excessive sedation, Dry mouth and skin</p> <p>Sympathomimetic effect: tachycardia, Sweating, Dilated Pupils.</p> <p>ECG: Sinus tachycardia (Common), Prolongation of ORS, QT, PR</p> <p>Usually, the patient is in metabolic Acidosis,</p> <p>→ Give IV fluid 250 ml Bolus (0.9% NaCl) +</p> <p>IV injection of Sodium Bicarbonate 50-100 ml of 8.4% slowly</p> <p>(50 mmol Sodium bicarb is given by slow IV injection)</p> <p>N.B. aim for pH of 7.5-7.55!</p> <p>Sodium bicarb will correct ECG changes and cardiac rhythm.</p> <p>Important Note: In TCA toxicity- eg, amitriptyline overdose: There could be <u>hyperkalemia</u> resulting from the <u>metabolic acidosis</u> → Give <u>IV fluids and IV sodium bicarbonate</u> to treat the metabolic acidosis and therefore the hyperkalemia would resolve. So, pick IV sodium bicarbonate Instead of calcium gluconate.</p>

Organo-phosphates

The active ingredient in the insecticides.

Overdose: Increased Saliva and Tears production, Diarrhea, Vomiting, **Small Constricted** pupils, sweating, muscle tremors and confusion.

Example:

A patient presents with epigastric pain and hematemesis for 24 hours. He was drinking alcohol yesterday and he took excessive amount of a medicine that he cannot remember its name. He is tachycardic and hypotensive. His LFTs are severely deteriorated. What is the likely diagnosis and the drug being used?

→ **Acute Liver Failure due to Paracetamol Overdose.**

He might have been taking paracetamol as he was drunk and having headache. **Acute liver failure usually develops 24 hours after paracetamol overdose.** The patient presented after 24 hours, which supports the answer.

Key
17

Note:

Not all patients who have taken more than 24 hours are subject to receive IV N-Acetylcysteine. If there are **no indications** to immediately start the antidote, we will usually **measure the serum paracetamol level at 4 hours post-ingestion** and decide accordingly.

IV N-Acetylcysteine should be given immediately if:

- There is a **staggered overdose** (all the tablets were not taken within 1 hour)
- There is **doubt over the time** of paracetamol ingestion, regardless of the plasma paracetamol concentration.
- Patients present **> 8 hours** after ingestion.
- **Jaundice** or **liver tenderness**.
- The Patient is **unconscious** or have a suspected overdose.
- The 4-hour post ingestion **plasma paracetamol concentration** is **on** or **above treatment line** regardless of risk factors of hepatotoxicity

Example

If a patient presents after ingesting **30 tablets** of paracetamol but **without** any other indications for initiating N-Acetylcysteine. What to do?

→ Measure the **paracetamol levels at 4 hours post-ingestion** (Calculated from the time of ingestion, not the time of hospital arrival) before commencing N-Acetylcysteine.

Example

A patient presents to the A&E 2 hours after ingesting 30 tablets of aspirin.

	<p>→ request for serum paracetamol levels after 2 hours</p> <p>(He presents 2 hours after ingestion + additional 2 hours = 4 hours after ingesting paracetamol)</p>		
Key 18	<p>If a patient presents with ongoing bleeding and hypotension (e.g. a butcher has injured his thigh and presents with active bleeding), the INITIAL Line would be →</p> <p>IV Fluids (Along with Cross-Match).</p> <p>IV fluid is superior to blood transfusion as an initial step. This is because IV fluid is available at the A&E department while the Packed RBCs need some time to arrive. Thus, we start with IV fluid resuscitation while waiting for the Blood to arrive.</p>		
Key 19	Types of Surgical Bleeding		
	Primary hemorrhage	Bleeding at the time of surgery.	Rx: Replacing Blood or return to theatre if severe.
	Reactionary hemorrhage	Bleeding within 24 hours after surgery/ Trauma. e.g. a patient is bleeding and is hypotensive while in the recovery room.	Usually due to slipping of ligatures, dislodgement of clots, warming up post-op leading to vasodilatation and rising of BP to normal. Rx: IV fluid, replacing blood, wound re-exploration.

Secondary hemorrhage

1 to 2 weeks post-op

Usually due to necrosis of blood vessels related to the previous repair, and precipitated by wound INFECTION.

Key
20

An unresponsive patient after a trauma (e.g. a punch on the face, an accident).

→ The initial step → **Clear Airways** (ABC: Airway, Breathing, Circulation).

We Always Start With ABC

Airway → Breathing → Circulation.

Key
21

After thyroidectomy, the patient was found cyanosed and hypotensive in the recovery room with the neck being tense and with blood oozing from the drain.

The type of bleeding? → **Reactionary Hemorrhage**

(It occurs within the first 24 hours after the operation)

Key
22

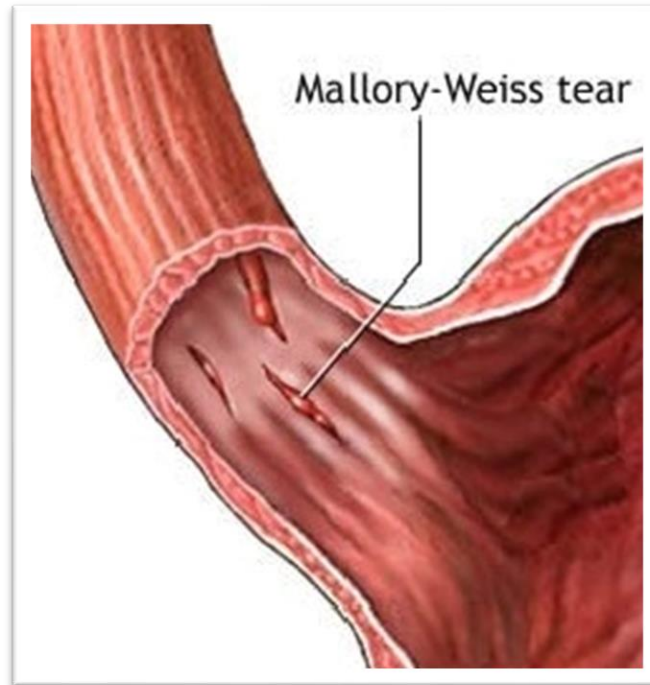
Examples of Oesophageal Disorders

Disorder	Notes
Plummer-Vinson syndrome	<p>Triad of:</p> <ul style="list-style-type: none"> • dysphagia (secondary to oesophageal webs) • glossitis • iron-deficiency anaemia <p>Treatment includes iron supplementation and dilation of the webs.</p>
Mallory-Weiss syndrome (Tear)	<p>Severe vomiting → painful mucosal lacerations at the gastroesophageal junction resulting in haematemesis. Common in alcoholics.</p> <p>See Below</p>
Boerhaave syndrome	Severe vomiting → oesophageal rupture

Mallory-Weiss syndrome (Tear)

Severe repetitive vomiting → painful mucosal **lacerations** at the gastroesophageal junction resulting in **haematemesis**.

Common in **alcoholics**.



- If the patient is **vital** and haemodynamically **stable**, with a **normal Hb**, either one of the following is the correct answer:
- **Discharge with Advice. OR**
- **Repeat FBC (Full Blood Count). OR**
- **Observe Vital Signs for fear of deterioration.**
- **Discharge low-risk patients** home according to "**Blatchford Score**":

- Systolic BP ≥ 110
- Urea <6.5
- Hgb: ≥ 13 in males, or ≥ 12 in females.
- Pulse: <100
- Absence of Melena, Liver disease, HF, Syncope.

If severe → Resuscitation (**high flow O₂, IV fluids, IV blood** if needed)

- **Admission** and **early endoscopy** + calculation of full “**Rockall score**” if:
 - SBP <100 and pulse ≥ 100 (Haemodynamic disturbance).
 - Continued bleeding (i.e. witnessed haematemesis or haematochezia).
 - Age: ≥ 60 (**all patients > 70 Y/O should be admitted**).
 - Liver disease, HF, Known oesophageal varices.

Key 23 Stages of Hypovolemic (Hemorrhagic) Shock

Parameter	Class I	Class II	Class III	Class IV
Blood loss ml	$<750\text{ml}$	750-1500ml	1500-2000ml	$>2000\text{ml}$
Blood loss %	$<15\%$	15-30%	30-40%	$>40\%$
Pulse rate	<100	100-119	120-139	>140

Blood pressure	Normal	Normal	Decreased	Decreased
Respiratory rate	14-20	20-30	30-40	>35
Urine output	>30ml	20-30ml	5-15ml	<5ml
Symptoms	Normal	Anxious	Confused	Lethargic

Therefore,

If a patient presents with ongoing hemorrhage (Bleeding), always try to link the **Pulse rate** to the Class (**Stage**) of the hypovolemic shock.

Example (1).

A patient presents with severe bleeding after stabbing his thigh. His HR is 130.

→ He is in **Class III** → i.e. he has lost around **30-40%** of his blood, and so on.

Example (2).

A patient presents with severe bleeding after stabbing his thigh. His HR is 112. What is the estimated blood loss?

→ He is in **Class II** → i.e. he has lost around **15-30%** of his blood,

This means 750-1500 ml.

In a recent exam, the closest answer within this range was **1000 ml**.

Key 24	<p>Whenever you see GCS \leq 8</p> <p>→ immediately think of Intubation (or: Inform the anaesthetist).</p>
Key 25	<p>In an alcoholic patient who wants to stop drinking but his main concern is that he lacks support and encouragement.</p> <p>→ Refer for social services to get the required support.</p> <p>Note that his main concern is to get support. We do not need to admit him to the hospital for detoxification or to psychiatry. All he requires is social support and a push! This is usually the job of the social services.</p>
Key 26	<p>A patient has ingested 30 tablets of paracetamol and presents to A&E with confusion and feeling unwell. IV N-Acetylcysteine was given. 24 hours after the treatment, she is still confused. Her Labs show:</p> <p>Hb: 13</p> <p>WBC: 6</p> <p>pH: 7.12</p> <p>Creatinine: 245 (Normal: 70-150)</p> <p>PT: 18 (Normal: 11-14 sec)</p>

☐ The most appropriate management → **Liver Transplantation!**

♠ Be careful, acute liver failure in paracetamol starts **24 hours after** the overdose being ingested.

♠ Here, the **pH is 7.1**, which is an indication for liver transplantation.

When to refer a patient with paracetamol overdose for Liver Transplantation? (Imp)

King's College Hospital criteria for **liver transplantation** (**Paracetamol Liver Failure**)

☐ Arterial pH **< 7.3**, **24 hours** after ingestion

☐ Or **all** of the following:

- Prothrombin time (**PT**) **> 100** seconds
- **Creatinine > 300** µmol/l
- Grade **III** or **IV encephalopathy**

Key
27

Carbon Monoxide (CO) poisoning

- Carbon Monoxide is tasteless, odourless gas, produced by incomplete combustion.

- **Causes** → Car exhausts, Fires, Faulty gas heaters, Paints.
- **Pathogenesis:** CO decreases the Oxygen-carrying capacity by binding to the Haemoglobin to form Carboxyhaemoglobin (COHb) → This impairs O₂ delivery to the tissues, leading to → Tissue hypoxia.
- One example is CO poisoning due to
→ inhalation of **Methylene Chloride** (Dichloromethane) from the **PAINT** fume.
- **Features** → Severe **Dizziness, headache** (usually tension headache) + **Malaise + Vomiting**.
- **If severe** → Pink skin and mucosae, Fever, Hyperventilation (trying to get O₂ as much as possible), Arrhythmia, Coma.
- **The investigation of choice** → **Carboxyhemoglobin levels**.

- **Management** → **100% Oxygen** administered via **a tight-fitting face mask**. (Standard Oxygen Therapy).

- **Points on Management:**

- The elimination of half-life of CO takes about 4 hours on breathing air, 1 hour on 100% O₂, and 23 minutes on O₂ atmosphere pressures.

- **ABC:**

- Clear airway.
- Maintain ventilation with high concentration of O₂.
- **If Conscious** → **100% O₂** via a **tight-fitting face mask** with an O₂ reservoir.
- **If Unconscious** → Intubate and Ventilate with IPPV (Intermittent Positive-Pressure Ventilation) on 100% O₂.

Careful! If the patient is **hypotensive** (**SBP < 100**) and **Unconscious** → **Intubation + IPPV 100% O₂**

Key
28

Management of Upper GIT Bleeding due to Varices
(Key Points)

- 1) Always start with **IV fluids**. (if the question asks about the “**initial**” step).
- 2) **Terlipressin** (2mg IV repeated every 4-6 hours) and **prophylactic antibiotics** (e.g. **Ciprofloxacin** or **Cephalosporin**) should be given to patients at presentation (i.e. before endoscopy)
- 3) **Endoscopy** → **band ligation** should be used for oesophageal varices and injections of N-butyl-2-cyanoacrylate for patients with gastric varices.
- 4) **Transjugular intrahepatic portosystemic shunts (TIPS)** should be offered if bleeding from varices is **not controlled** with the above measures

Other Important Notes:

- **Avoid PPI (e.g. Omeprazole)** in acute cases unless the patient is a known peptic ulcer patient.
- If INR is prolonged → **Vitamin K**.
- Liver disease + Hematemesis + ↑ INR → **Fresh frozen plasma**.
- If the patient is actively bleeding and the **platelet count is < 50.000** → **Platelet transfusion**.
- Balloon Tamponade is only used as a salvage procedure when the patient is massively bleeding non-stop and at risk of death.
- GI bleeding is dealt with by [**Medical team**] not surgeons!

☐ **Very Important:**

✓ If a patient with **liver disease** presents with **Hematemesis** and **high INR** → Give **Fresh Frozen Plasma (FFP)**.

✓ However, if the question asks about the most appropriate “initial” step, the answer would be → IV fluid.

Key
29

A patient had RTA and brought to ED unconscious. O/E → Perineal bruising. Pelvic fracture was confirmed. He has urinary retention since the accident.

The best Next Course of Action → **Suprapubic Catheterisation**.

- **Posterior urethral tear** is often associated with **pelvic fracture**.
- Look for **perineal bruising, blood** at the external urethral meatus.
- **PR examination**: an abnormally high-riding prostate OR inability to palpate the prostate → Suspect Urethral injury.
- **Management**: Refer to Urology team for: **Suprapubic catheterization ± Retrograde/ Ascending urethrogram** imaging to assess the urethral injury.
- **We cannot perform urethral catheterisation as the urethra is injured!**

Key
30

Flail Chest

- Chest wall disconnects from thoracic cage
- Multiple rib fractures (**at least two fractures per rib in at least two ribs**)

- Associated with pulmonary contusion (**a trauma to the chest**)
- Abnormal chest motion (**Paradoxical; on inspiration, one side pulls inwards while the other side pulls outwards**), Chest pain, SOB.
- There may be absent breath sounds.
- Avoid over hydration and fluid overload

▣ Management of Flail Chest:

- **High Flow O2 (Initial).**
- **Analgesia (Initial):** Paracetamol/ NSAIDs/ Opiates/ **Intercostal block/** Thoracic epidural (up to T4).
- **Intubation/ Mechanical Ventilation:** if worsening fatigue and RR (laboured breathing).

The usual hint is the **Trauma + Paradoxical** Chest movement

▣ **Flail Chest "Initial"** Management simplified:

- If vitally **Stable + Normal Vitals + Normal SpO2**
→ **Analgesia** (e.g. intercostal block).
- If vitally **Unstable**
→ **ABC first then Analgesia (High flow O2 then Analgesia).**

- If **Drowsy, Laboured breathing, Worsening Respiratory Rate**

→ **Intubate** first.

(usually with a **double lumen endotracheal tube** as one side of the chest is affected more than the other).

Key
31

Hereditary angioedema = C1 Esterase Inhibitor Deficiency

- A rare **genetic** condition causing **episodes of angioedema** which may include life-threatening laryngeal edema.
- Hereditary angioedema is an **Autosomal Dominant** condition associated with **low plasma levels of C1 esterase inhibitor** (C1-INH) protein.

Investigation

- C1-INH level is low during an attack (Acutely).
- low C2 and C4 levels are seen, even between attacks.
- **Serum C4** is the most reliable and widely used screening tool.

S&S

- **Recurrent episodes** of **facial** and **tongue swelling** (May begin in early childhood).
- attacks may be preceded by painful macular rash.

- **Family History.**

- Painless, non-pruritic swelling of subcutaneous/submucosal tissues.
- May affect upper airways, skin or abdominal organs (can occasionally present as **abdominal pain** due to visceral oedema).
- urticaria is not usually a feature.

Management

- **Acute:** IV C1-inhibitor concentrate, fresh frozen plasma (FFP) if this is not available
- **Prophylaxis:** anabolic steroid **Danazol** may help.

Example:

A 14-year-old boy presents to ED with recurrent attacks of facial and tongue swelling along with abdominal pain. His father has had similar episodes during his childhood.

The likely Dx → **C1 Esterase Inhibitor Deficiency (= Hereditary Angioedema)**

Key
32

Perforated Peptic Ulcer

- Acute abdomen.
- Vomiting.
- Severe epigastric pain ± radiates to the **tip** of the **shoulder**.

- Progress to **generalised abdominal rigidity**.
- **Hx** of taking **NSAIDs** (e.g. for **Rheumatoid Arthritis or any other condition**).
- Dx: **Erect Abdomen and Chest X-Ray** (**NOT U/S**)!
→ **Air under diaphragm**.

Key
33**Very Important NOTE**

A Post-op patient (in LL femoral arteries) develops LL swelling + is going into shock (Hypotensive) → Think of a **hemorrhage** at the site of the swelling and **INITIALLY** and **IMMEDIATELY** → **APPLY PRESSURE at the site of the swelling even before giving IV fluid** as there is most likely bleeding beneath it.

Key
34

After RTA “Road Traffic Accident”, a patient is brought to the ED with the following features: Breathlessness, severe chest pain, Hypotension (Systolic BP is 70), Tachycardia. You should start with which of the following?

Analgesics, Antibiotics, High flow O2 or Secure venous access?

The answer is → **High flow O2**.

Remember, always start with **ABC** (**Airway** → **Breathing** → **Circulation**).

So, Oxygen is before Securing venous access.

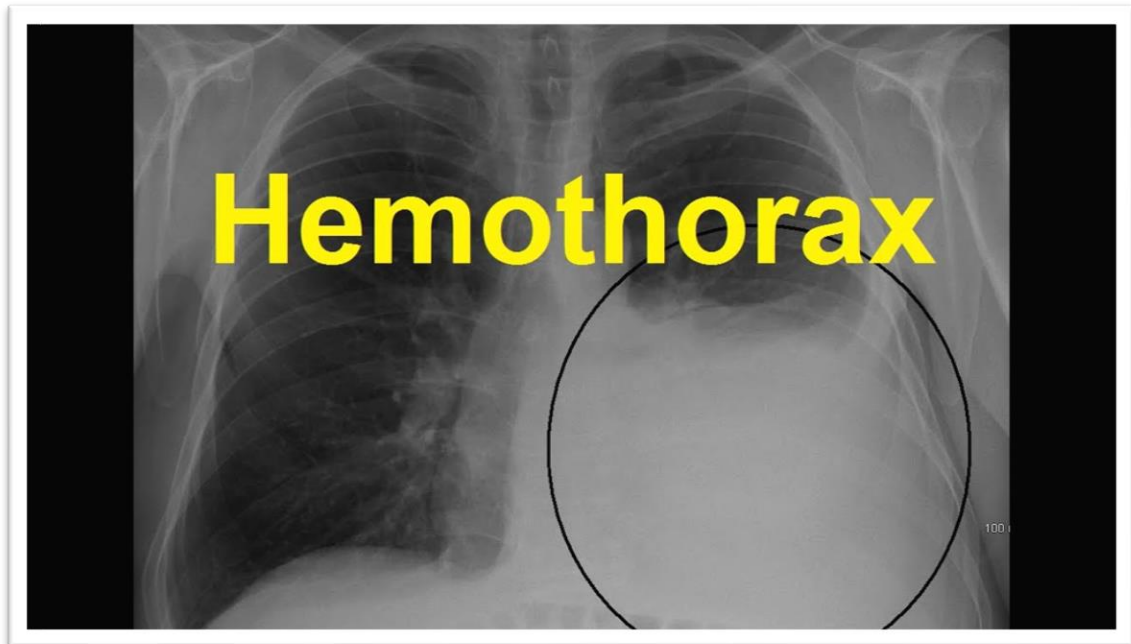
Key
35

A 20-year old male is brought to the ED after receiving a knife stab on his upper left side of his back. He is hypotensive (82/60),

tachycardic (125) and tachypnic (33). Chest X-ray reveals homogenous opacity in the lower left lung. The trachea is central. What is the likely diagnosis?

The likely diagnosis is → **Haemothorax**

- ☐ There is bleeding manifested by the **hypovolemia** (hypotension and tachycardia). Blood accumulates in the pleural cavity.
- ☐ **Homogenous Opacity** = **White** = **fluid** not gas = either blood or effusion.
- ☐ In pneumothorax, the x-ray will be **Hyperlucent** (air) not homogenous (fluid).
- ☐ In Tension Pneumothorax, the trachea will most likely be deviated away from the pneumothorax side.
- ☐ Percussion:
 - Pneumothorax → Hyperresonance.
 - Haemothorax → Dullness.



▣ Other points on Haemothorax:

- Most commonly due to laceration of lung, intercostal vessel or internal mammary artery.
- Haemothoraces that are large enough to appear on CXR are treated with **large bore Chest drain (Chest tube) → Evacuation of blood may be necessary to prevent the development Empyema.**
- Surgical exploration is warranted if >1500ml blood drained immediately (**rarely needed** as the source of bleeding is the lung which is a low-pressure system).
- **Dullness on percussion, Hypovolemia, No fluid level on CXR.**

Key
36

In **Mallory-Weiss Tear**

(severe alcohol intake → severe vomiting → Gastroesophageal laceration → hematemesis):

- **Admission** and **early endoscopy** if:

hemodynamically unstable or continued hematemesis:

- SPB <100 and pulse ≥100.
- Continued bleeding.
- Age: ≥ 60 (all patients > 70 Y/O should be admitted).
- Liver disease, HF, Known oesophageal varices.
- If the patient is **vitaly** and haemodynamically **stable**, with a **normal Hb**, either one of the following is the correct answer:
 - **Discharge with Advice. OR**
 - **Repeat FBC (Full Blood Count). OR**
 - **Observe Vital Signs for fear of deterioration.**

Key
37

Heroin withdrawal features:

Think of it as it is your girlfriend :D 😊

Your (heroin) leaves you "Withdrawal". "different from heroin overdose!"

- You cry a lot → **Watery eyes** and **runny nose**.
- You cannot sleep → **Insomnia**.
- You miss her → **Agitation**.

Body aches, runny nose, agitation → **opiate withdrawal**.

Drug Withdrawal Features

Heroin	<ul style="list-style-type: none"> - Withdrawal begins 12 hours after last dose - Peaks at 24-48 hours - Increased body secretions: <u>sweating</u>, diarrhea, runny nose, tearing (Flue-like symptoms esp. early in withdrawal) + - Pain: <u>Abdominal pain</u>, joints (<u>arthralgia</u>), muscle aches. + - Others: <u>agitation</u>, insomnia, anxiety (common in other drugs)
Benzo-diazepines	<ul style="list-style-type: none"> - Withdrawal begins 1-4 days and peaks at 2 weeks. - Panic attacks + Other common (agitation, insomnia, anxiety) <p>Remember:</p> <p>Benzodiazepines are used to treat panic attacks and anxiety. They are also used to initially manage cocaine overdose (eg, lorazepam).</p>

	Cocaine	<ul style="list-style-type: none"> - Within hours of last dose and peaks in a few days. - Depression, irritability, muscle aches + Others (insomnia ...)
	Alcohol	<ul style="list-style-type: none"> • symptoms start at 6-12 hours: tremor, sweating, tachycardia, anxiety. • peak incidence of seizures at 36 hours • peak incidence of delirium tremens is at 48-72 hours: <u>coarse tremor, confusion, delusions, auditory</u> and <u>visual hallucinations, fever, tachycardia</u> <p>Management</p> <ul style="list-style-type: none"> • first line: benzodiazepines e.g. chlordiazepoxide. Lorazepam may be preferable in patients with hepatic failure. Typically given as part of a reducing dose protocol • carbamazepine is also effective in treatment of alcohol withdrawal • phenytoin is said not to be as effective in the treatment of alcohol withdrawal seizures

Management of Acute Alcohol Withdrawal: (**Important** ✓)

◆ **Benzodiazepines** ✓

✓ First line → **Chlordiazepoxide**.

✓ First line if there is withdrawal Seizure → **Lorazepam** (Or **Diazepam** “If IV Lorazepam is not in the options)

◆ **Vitamin B1 (Thiamine) = (IV Pabrinex)**: To prevent Wernicke’s encephalopathy.

Other drugs related to Alcohol Intake:

◆ **Disulfiram**: Promotes Abstinence. (Serves as a deterrent when he takes alcohol).

◆ **Acamprosate**: Reduces Craving.

Drug Overdose (Intoxication)

Heroin

- Respiratory Depression (↓ RR)
- ↓ BP
- ↓ HR (pulse)
- Pinpoint pupils (constricted pupil)
- Constipation
- Give **Naloxone**

Cocaine

- ↑ BP (new onset hypertension, mostly young age).
- ↑ HR (Pulse).
- ↑ RR.
- Mydriasis (dilated pupils).
- ↓ weight (unexplained).
- **Hyperthermia** and **sweating**.
- Restlessness, Agitation, mood changes, sleep changes.
- Intranasal use → epistaxis, rhinitis.

		<ul style="list-style-type: none"> • Complications → Acute MI, intracranial hemorrhage, seizures, aortic dissection. • Request → Urine drug screen (for diagnosis). <p>Initial Management → <u>Benzodiazepines</u> (eg, <u>lorazepam</u>).</p>
	<p>Ecstasy</p>	<ul style="list-style-type: none"> • Agitation, confusion, anxiety, ataxia. • Tachycardia, hypertension • Tachypnoea. • Thirst. • Metabolic acidosis (e.g., ↑ venous lactic acid). • Hyperthermia (↑ body temperature). • Muscle rigidity. • Spots of colours (flashing/ flouing colours). • Uncontrolled body movements, muscle rigidity, trismus. <p>Management</p> <ul style="list-style-type: none"> • Supportive: ABC + treat metabolic acidosis. • IV diazepam or lorazepam: for agitation. • Dantrolene can be used for hyperthermia and muscle rigidity if simple measures fail.

LSD (Lysergic Acid Diethylamide)	Mydriasis (Dilated pupils) – Flushing and sweating – Tremors – Hyperreflexia-Diarrhea – Paraesthesia Delusions and Hallucinations (Pathognomonic) A patient smelling colours and seeing sounds → LSD Patients see colours when their eyes are closed.
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Notes on withdrawal:

- ☐ **Heroin** → ↑ body secretions (watery eyes, runny nose, diarrhea, sweating) + Pain (abdomen, muscles) + Others.
- ☐ **Cocaine** → **DEPRESSION** + Others.
- ☐ **Benzodiazepines** → Panic attacks + Others.
- ☐ **Alcohol** → Nausea, Vomiting, Irritability + tremors ± Hallucinations + Others

Notes on Overdose (Intoxication)

- ☐ **Heroin** → everything is decreased: low HR, Low RR, Low BP, Pinpoint (Constricted) pupils.
- ☐ **Cocaine** → The Opposite: high HR, high RR, high BP, Mydriasis (Dilated pupils) ± **hyperthermia** (fever) and **sweating**.
- ☐ **LSD** → delusions, hallucinations, a patient sees sounds and smells colours.

Key 38	<p>Management of Panic Attacks:</p> <ul style="list-style-type: none"> ☐ Simple breathing exercise such as breathing through nose, paper bag, slowing down breathing + Reassurance is all that is needed. ☐ Others, in severe and acute (still ongoing) <p>→ Benzodiazepines (e.g. diazepam, lorazepam) + Propranolol (if no Asthma).</p> <p><i>Remember, Asthma + β-Blockers → Do not mix 😊</i></p>
Key 39	<p>Alcohol + Vomiting + Hematemesis → Mallory-Weiss Syndrome</p>
Key 40	<p>Thoracic aorta rupture</p> <ul style="list-style-type: none"> • Mechanism of injury: Decelerating force i.e. RTA, fall from a great height. • Most people die at scene • Survivors may have an incomplete laceration at the ligamentum arteriosum of the aorta. <p>Clinical features</p> <ul style="list-style-type: none"> • Contained haematoma: persistent hypotension • Detected mainly by history, CXR changes <p>By far, the commonest site of injury is the Proximal <u>Descending Aorta</u>.</p> <p>CXR changes</p>

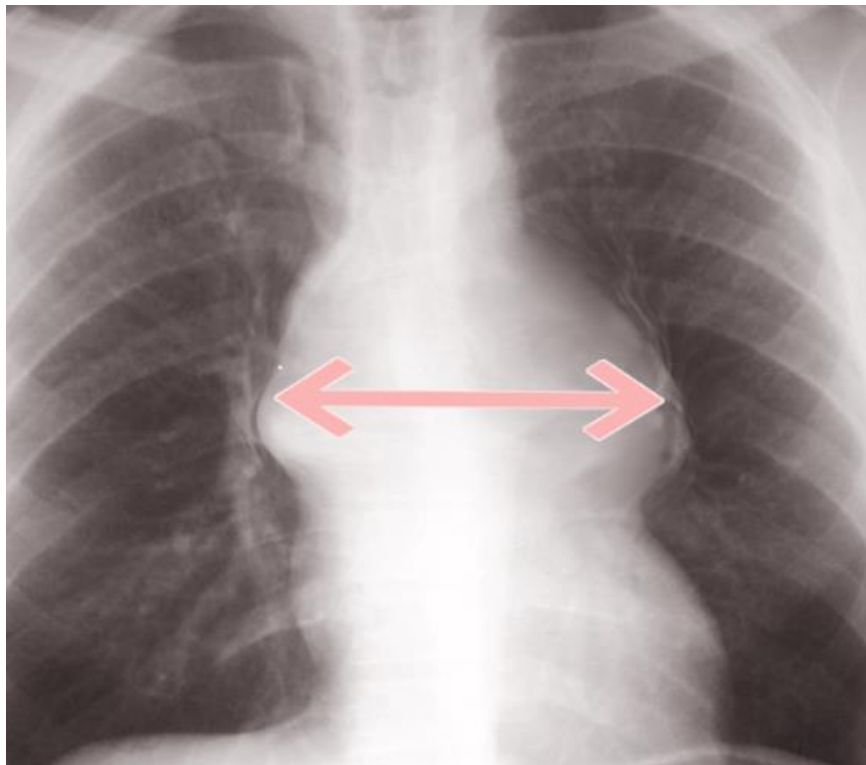
- **Widened mediastinum**
- **Trachea/Oesophagus to right**
- Depression of left main stem bronchus
- Widened paratracheal stripe/paraspinal interfaces
- Rib fracture/left haemothorax

Diagnosis

Angiography, usually **CT aortogram**.

Treatment

Surgical Emergency. Repair or replacement. Ideally, they should undergo endovascular repair.



Wide Mediastinum in Thoracic Aortic Rupture.

- **Example (1):**

Road Traffic Accident, Hypotension, **Widened Mediastinum on CXR.**

→ **Rupture of Thoracic Aorta.**

→ Surgical Emergency.

- **Example (2):**

Road Traffic Accident, Hypotension, **Homogenous Opacity on CXR.**

→ **Hemothorax**

→ Chest drain to prevent empyema. Surgery rarely needed.

Key
41

Start IV N-Acetyl Cysteine immediately after Paracetamol Overdose (without waiting for the serum paracetamol level) if:

✓ **Unknown dose.**

✓ **Unknown time (Doubtful time)** of ingestion.

✓ **Staggered dose** (all tablets were not taken at the same hour).

✓ Presenting **> 8 hours** after ingestion.

✓ Presenting **Unconscious** or with **Liver tenderness** and **Jaundice**.

If not, then → Measure the paracetamol level **4-hours post ingestion** (Not Post-admission).

Note:

Paracetamol Overdose is treated in the **Medical Ward** not in the Psychiatric ward. Thus, sometimes → “Admit to the medical ward” is the correct answer. However, a referral to **psychiatric team (especially psychiatric liaison)** is usually required after finishing the medical treatment.

→ *Psychiatric liaison are nurses who are trained to receive mental health referrals from A&E. They can decide whether the patient is mentally safe to be discharged or they need further psychiatric admission and treatment.*

(This can be done if a patient attempted a potentially self-harmful act and when **no Medical treatment is required**. The referral to psychiatry aims at preventing recurrent attempts of suicide and treating any possible psychological abnormalities).

■ If pH is **< 7.3** after 24 hours → **Refer for a liver specialist centre**. Imp ✓

Key
42

A young man was found unconscious. HR is 52, RR is 6. His pupils are constricted.

The likely diagnosis → **Heroin (Opioid) overdose.**

The initial step → **Give Naloxone.**

**Heroin
Overdose
(Toxicity)**

- Respiratory Depression (**Low RR**)
- **Low BP**
- **Low HR**
- **Pinpoint pupils** (constricted pupil)
- Constipation
- Give **Naloxone**

**Cocaine
Overdose
(Toxicity)**

- **High RR**
- **High BP**
- **High HR**
- **Mydriasis** (dilated pupils)
- **Hyperthermia** and **sweating**
- Restlessness and Agitation

Initial Management → Benzodiazepines (eg, lorazepam).

Key 43	<p>What if the Serum Paracetamol level is below the treatment level?</p> <p>→ Refer the patient to the psychiatric team.</p> <p>(No Medical treatment is required. However, a referral to psychiatry is usually required to investigate and manage any psychological illnesses that have made this patient to ingest this high dose of paracetamol)</p> <p>Important Note:</p> <p>If the patient attends to the hospital on his own after ingesting paracetamol overdose, NO compulsory admission to the psychiatric ward is required as he regrets his act and comes seeking treatment.</p> <p>We only refer him to psychiatric liaison to assess his psychological wellness and decide on discharge and follow up as needed.</p> <p>NOTE:</p> <ul style="list-style-type: none"> • Acute Alcohol consumption is an inhibitor of P-450 enzyme system → reduce the risk of paracetamol poisoning.
Key 44	<p><u>NOTE:</u></p>

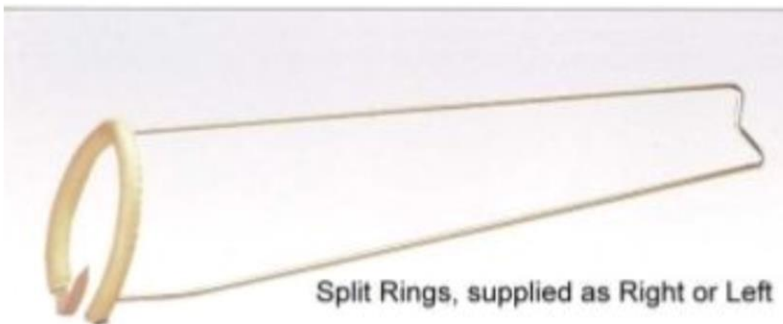
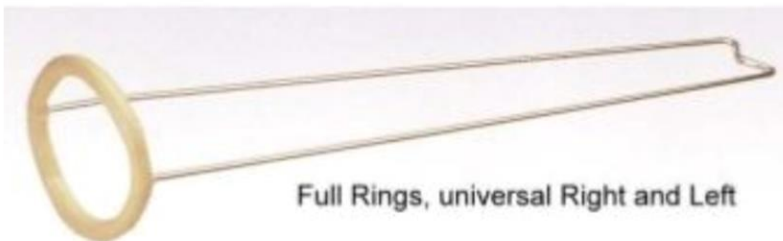
In a **femur fracture**, if the patient is hemodynamically stable (SBP >100) → **Thomas Splint** first “Before IV fluid and before ABCDE”

This is to align the fracture; thus, reducing the blood loss as the femur fracture bleeds significantly).

You need to know that splinting the femur leads to → Alignment of the fracture → and thus, Reduce the blood loss.

If not stable → **ABCDEs** (ATLS) first.

THOMAS SPLINT



- Devised by Hugh. Owen Thomas.
- Initially used for immobilisation for tuberculosis of the knee.

Uses:

- Immobilization for the injuries of the hip and thigh
- Transportation of patient with lower limb injuries(eg: Femur fracture)

Key
45

Burns and Maintaining Airways

■ After a major burn, if there is any evidence of airway obstruction (e.g. **Stridor, Oropharyngeal swelling, evidence of inhalation injury**)

→ Call for a senior ED and a senior **Anaesthetist** help immediately for urgent General Anaesthesia and **Tracheal intubation** (might be life-saving).

■ **Smoke inhalation injury** is a common cause of death in burn victims.

- Initial assessment may reveal no injury, but **laryngeal oedema** may develop suddenly and unexpectedly. Thus, **early intubation is warranted if there is evidence of inhalation injury**.

■ **S&S of smoke inhalation injury**

- Persistent cough.
- Stridor.
- Wheezes.
- Black sputum and soot (suggesting excessive exposure to soot)
- Use of accessory muscles of respiration.
- Blistering or oedema of the oropharynx.
- Hypoxia or hypercapnia.

Also, if unconscious → Intubate and provide IPPV on 100% O₂

Key 46	<p>A patient in the ambulance after RTA deteriorates (decreased GCS and Increased RR)</p> <p>→ Give 100% O2</p> <p>Note: (<i>Needle Thoracocentesis is done only if there are clinical manifestations of Pneumothorax such as deviated trachea</i>).</p>
Key 47	<p>■ Calf swelling + Positive Homan's sign (pain on dorsiflexion) → Think of DVT (Deep Vein Thrombosis) even if there are no RFs or skin changes.</p> <p>■ Baker cyst (popliteal cyst): a swelling behind the knee, not swelling of the calf muscles, usually asymptomatic.</p> <p>■ Popliteal cyst rupture: initially presents with a swelling and discomfort behind the knee which (when ruptures) can present as calf pain and swelling. However, DVT is more common.</p> <p>■ Achilles Tendon Rupture: Hx of popping sound + pain around the ankle + diminished plantar flexion.</p>

Key
48

A patient is brought to the ED after being rescued from a building on fire. He is Nauseous, Vomiting, Drowsy and Confused.

- The likely diagnosis → **CO Poisoning**.
- The investigation of choice → **Carboxyhemoglobin levels**.
- The initial step → **100% O2 given via Tight Fitting Mask**.
- If he was **unconscious** and **SBP < 100** (Hemodynamically unstable)
- **Intubation and Ventilation**.

Key
49

Notes on chest compression [CPR] in infants:

- The lone rescuer should compress the sternum with the **tips of two fingers** (**Index and Middle fingers of one hand**).
- If there are two or more rescuers, use the **encircling technique**:
 - Place **both thumbs** not one thumb flat, side-by-side, on the lower half of the sternum, with the tips pointing towards the infant's head.
 - Spread the rest of both hands, with the fingers together, to encircle the lower part of the infant's rib cage with the tips of the fingers supporting the infant's back.
 - Press down on the lower sternum with your two thumbs to depress it at least one-third of the depth of the infant's chest, approximately **4 cm**.

Chest compression in children aged over 1 year:

- Place the **heel of one hand** over the lower half of the sternum.
- Lift the fingers to ensure that pressure is not applied over the child's ribs.

- Position yourself vertically above the victim's chest and, with your arm straight, compress the sternum to depress it by at least one-third of the depth of the chest, approximately **5 cm**.
- In larger children, or for small rescuers, this may be achieved most easily by using both hands with the fingers interlocked.

Remember CPR Ratio:

☐ In adults → **30:2**

☐ In Paediatrics:

✓ **Layman (Normal people)** → **30:2**

✓ **Professional** → **15:2**

N.B. Layman = a person without professional or specialized knowledge in a particular subject.

Key
50

Unconscious patient after a prolonged generalised tonic clonic seizure (> 30 minutes)

→ **Initial step** → **Secure Airways** (ABC)

“Even if the patient has IV access” we need to secure airway first before giving IV Lorazepam.

N.B. A prolonged and ongoing seizure for > 30 minutes can lead to Cerebral Damage!

Key
51

Anaphylaxis

A child was brought to the ED cyanosed, coughing and with rash after eating a cookie.

The likely condition → **Allergic reaction (Anaphylaxis)**

Common identified causes of anaphylaxis:

- **Food** (e.g. nuts) – the most common cause in children
- **Drugs**
- **Venom** (e.g. wasp sting)

■ **Symptoms of anaphylaxis** usually involve more than one part of the body such as the **skin, mouth, eyes, lungs, heart, gut, and brain**. Some symptoms include:

- Skin rashes, itching and hives (**Urticarial Rash**).
- Swelling of the lips, tongue or throat.
- Shortness of breath, trouble breathing, wheezing (whistling sound during breathing), **cough, cyanosis**.
- Dizziness and/or fainting.
- Stomach pain, vomiting or diarrhea.

Management: IM adrenaline (epinephrine). The dose is as follows:

Age	IM Adrenaline (Epinephrine)
0 – 6 years	150 micrograms (0.15ml 1 in 1,000)
6-12 years	300 micrograms (0.3ml 1 in 1,000)
Adult and child > 12 years	500 micrograms (0.5ml 1 in 1,000)

■ After RTA, Perform → **FAST** (**F**ocused **A**bdominal **S**onography (**U/S**) for **T**rauma (the investigation of choice) or **CT Scan**.

→ Found **subcapsular splenic hematoma**

♠ If the patient is hemodynamically **stable** → **Observation (by Surgical team)**.

♠ The patient is hemodynamically **unstable** ± Free peritoneal fluids

→ **Emergency Laparotomy**.

Do not rush into Surgery! A stable patient is managed by surgical team with observation first. If deteriorates or was unstable from the beginning, emergency laparotomy is warranted.

Key
53

Urticaria (Allergic Reaction): (e.g., food, insect bites, drugs: Penicillin, stress)

■ **Oral antihistamines.**

■ **IM Adrenaline** (only if **anaphylactic shock**): e.g., SOB, stridor, hoarseness, wheezes, shock, swelling of tongue, face, cheek.

Example:

A child who has been bitten by bees presents with urticarial rash (numerous wheals) that are severely itchy.

→ **Give Oral Antihistamine**. (No indication of IM adrenaline here)

This is an **allergic reaction**. We do not give **IM adrenaline** unless **anaphylactic shock** is suspected by any of the following:

SOB | Stridor | Hoarseness | Wheezes | Shock | Swelling of tongue, face, cheek

If only itchy rash → **oral antihistamine**.

Key 54 Pupillary Responses to Light

<u>Unilaterally</u> dilated pupil	Space occupying lesion e.g. abscess, tumour, hematoma.	
Bilaterally constricted pupils (pinpoint = Miosis)	Opiate overdose e.g. morphine, heroin	CVA affecting the <u>brainstem</u>
Bilaterally dilated pupils (Mydriasis)	TCA overdose (Tricyclic Antidepressant) e.g. amitriptyline.	Cocaine overdose

Key 55 Side effects of Benzodiazepines (e.g. Lorazepam)

- **Respiratory Distress (Apnea): Life-threatening. [Low RR] imp v**

- Hypotension [low BP]
- Anterograde Amnesia
- Sedation
- Cognitive impairment

Key
56

Choking

Partial or complete airway obstruction is a life-threatening emergency. Episodes often occur whilst eating and patients will often clutch their neck. The first step is to ask the still conscious patient **'Are you choking?'**

Features of airway obstruction (taken from the Resus Council)

Mild airway obstruction	Severe airway obstruction
Response to question 'Are you choking?'	Response to question 'Are you choking?'
<ul style="list-style-type: none"> • victim speaks and answers yes 	<ul style="list-style-type: none"> • victim is unable to speak

Other signs

- victim is able to speak, cough, and breathe

Other signs

- victim may respond by nodding
- victim unable to breathe
- breathing sounds are wheezy
- attempts at coughing are silent
- victim may be unconscious

If mild airway obstruction

- encourage the patient to cough (He can speak and cough).

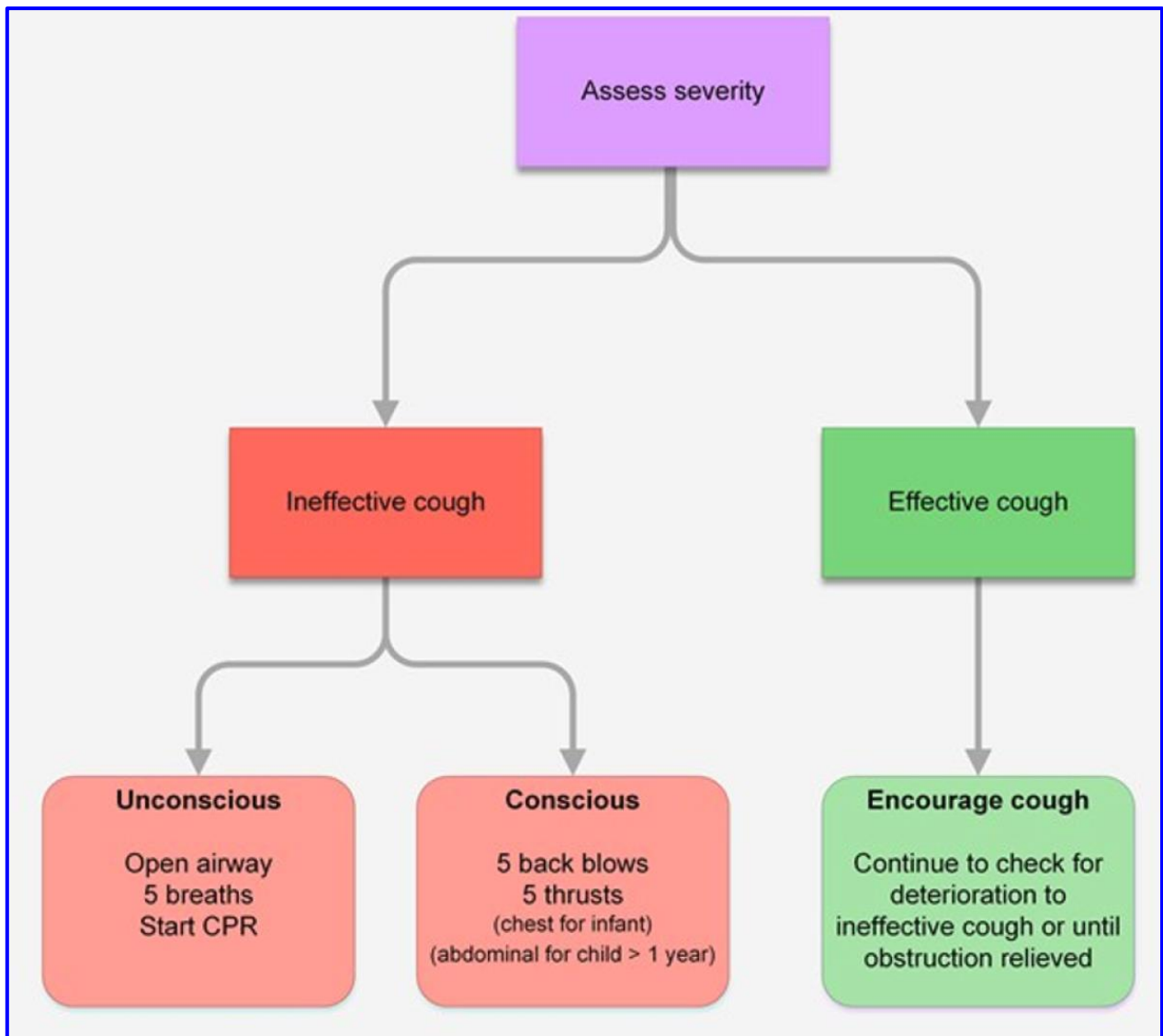
If severe airway obstruction and is still conscious:

- Give up to 5 back-blows
- If unsuccessful give up to 5 Abdominal thrusts (Heimlich manoeuvre) (for Adults) or 5 Chest thrusts (for infants <1y)
- If unsuccessful → continue the above cycle

If unconscious

- call for an ambulance
- start cardiopulmonary resuscitation (**CPR**)

CHOKING ALGORITHM



A summary from patient.info

- If coughing effectively → just encourage the child to cough and monitor continuously.

- If coughing is ineffective or is becoming ineffective → shout for help and assess the child's conscious level.
- If the child is conscious, give up to **five back blows**, followed by **five chest thrusts** to infants or five abdominal thrusts to adults and children of > 1 YO.
- (repeat the sequence until the obstruction is relieved or the patient becomes unconscious).
- If he becomes unconscious, call ambulance and begin CPR.

For infants (<1-year-old) – back blows and chest thrusts:

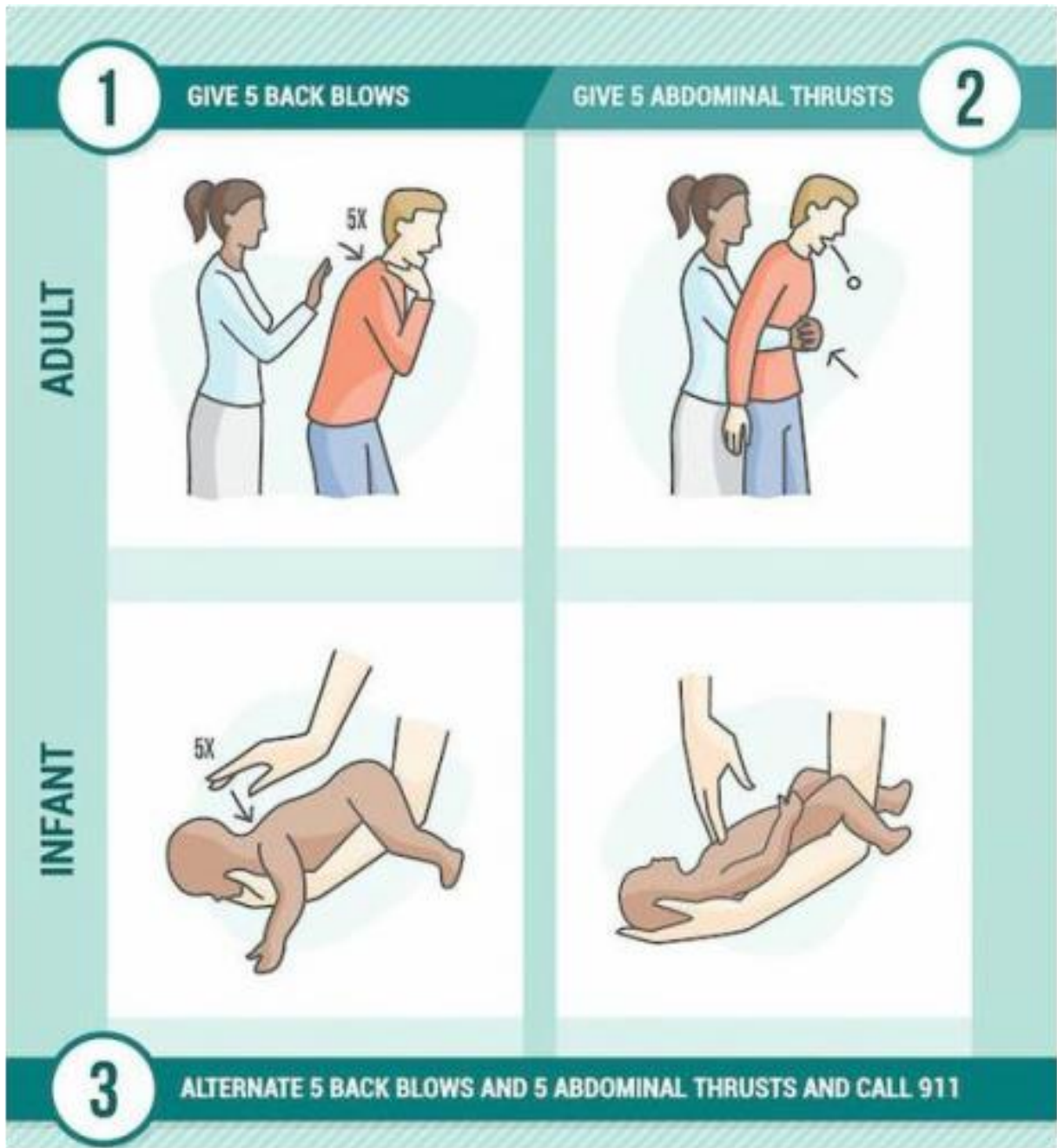
- In a seated position, support the infant in a head-downwards, **prone position** to let gravity aid removal of the foreign body.
- Support the head by placing the thumb of one hand at the angle of the lower jaw, and one or two fingers from the same hand at the same point on the other side of the jaw. Do not compress the soft tissues under the jaw, as this will aggravate the airway obstruction.

- Deliver up to **five sharp blows with the heel of your hand to the middle of the back** (between the shoulder blades).
- After each blow, assess to see if the foreign body has been dislodged and, if not, repeat the manoeuvre up to five times.



- After five unsuccessful back blows, use **chest thrusts**: turn the infant into a head-downwards supine position by placing your free arm along the infant's back and encircling the occiput with your hand. Support the infant down your arm, which is placed down (or across) your thigh. Identify the landmark for chest compression. This is the lower sternum, about a finger's breadth above the xiphisternum. Deliver five chest thrusts. These are similar to chest compressions for CPR, but sharper in nature and delivered at a slower rate.

For children (1 year old to puberty) – **back blows** and **abdominal thrusts**.



Key
57

Drugs with Blood Gases

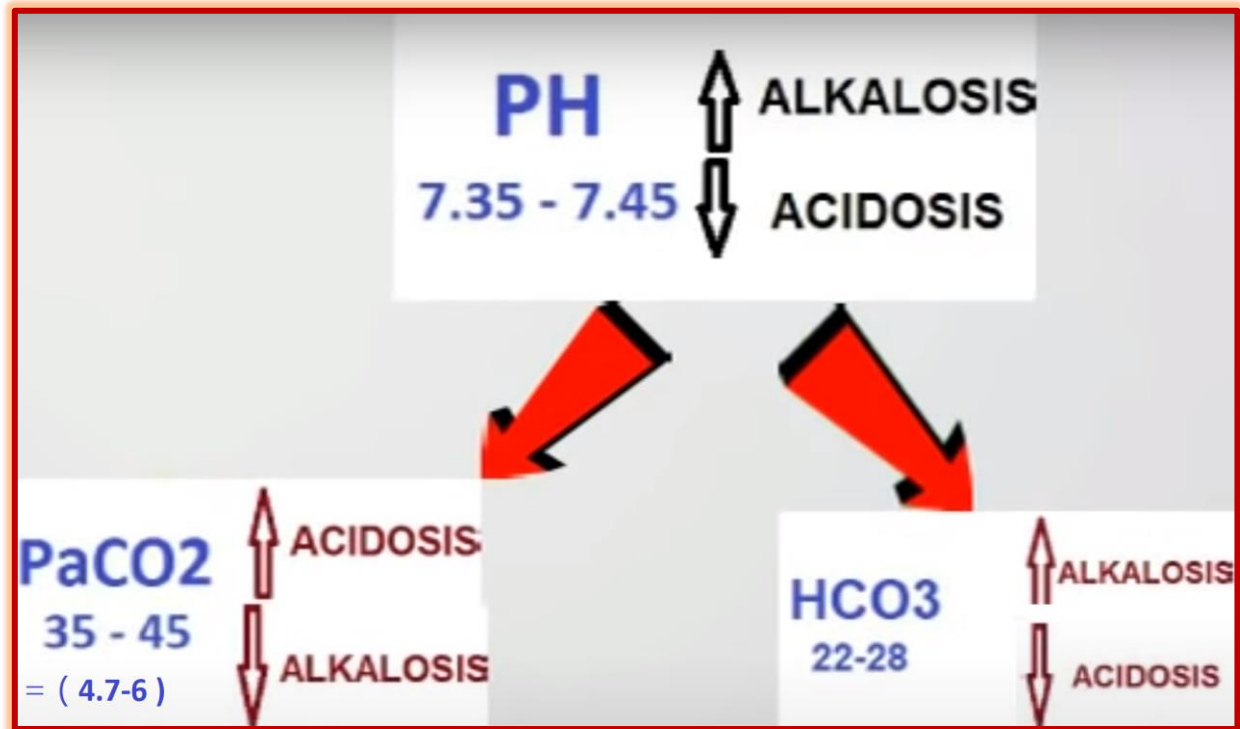
(Acidosis VS Alkalosis)

- **Aspirin, Paracetamol** → **Metabolic Acidosis** (However, pick Aspirin as it is more common)
- **ACEi** (e.g. enalapril) and **NSAIDs** (e.g. diclofenac) → **Metabolic Alkalosis**
- **Benzodiazepines** → **Respiratory Acidosis** (Apnea → Accumulation of CO₂)

NOTE: *Salicylate (Aspirin) Poisoning* → **Resp. Alkalosis** (Early) then **Met. Acidosis** (Later).

Remember:

- In **Metabolic Acidosis**, a patient would have a high RR (trying to wash out the CO₂ which is an acid) + Altered mental status + Nausea + Palpitations + Abdominal pain, Chest pain.
- **Benzodiazepines** (e.g. **Lorazepam**) overdose → Resp. depression (Apnea) → Accumulation of CO₂ which is an acid → **Respiratory Acidosis**.



The following points are for your knowledge; nonetheless, it is good to try to understand them as they will show up in other chapters.

- **pH** determines whether it is Acidosis or Alkalosis.
- **Bicarbonate** (Normally 22-26), if less → Metabolic Acidosis

If bicarb. Is normal → look at **PCO₂** (Normally 4.7-6), if low → Alkalosis, if high → Acidosis.

N.B. DO NOT Directly look at PCO₂ neglecting the bicarbonate as sometimes the bicarbonate might be low (Acidosis) simultaneously with a low PCO₂ (Alkalosis). The low PCO₂ in such a case is due to the respiratory compensation mechanism (washing out the CO₂ to buffer the acid)!

Metabolic Acidosis drugs mnemonic:

MAIAD: Metformin, Aspirin (late on), Isoniazid, Iron, Alcohol, Digoxin.

Or: **I AM AID**: Isoniazid, Aspirin, Metformin, Alcohol, Iron, Digoxin.

The steps (approach) to determine the type of the blood gas abnormality.

1. Is the patient **acidaemic** ($\text{pH} < 7.35$) or **alkalaemic** ($\text{pH} > 7.45$)?
2. Respiratory component: What has happened to the **PaCO_2** ?
 - **$\text{PaCO}_2 > 6.0$ kPa** suggests a **respiratory acidosis** (or respiratory compensation for a metabolic alkalosis)
 - **$\text{PaCO}_2 < 4.7$ kPa** suggests a **respiratory alkalosis** (or respiratory compensation for a metabolic acidosis)
3. Metabolic component: What is the **bicarbonate** level/base excess?
 - **bicarbonate < 22 mmol/l** (or a **base excess < -2 mmol/l**) suggests a **metabolic acidosis** (or renal compensation for a respiratory alkalosis)
 - **bicarbonate > 26 mmol/l** (or a **base excess $> +2$ mmol/l**) suggests a **metabolic alkalosis** (or renal compensation for a respiratory acidosis)

Simply, know that **CO_2 is an Acid, and Bicarbonate (HCO_3) is an Alkali.**

Arterial Blood Causes

Metabolic Acidosis

- Drugs (**MAIIAD**): Metformin, Aspirin (Later on), Iron, Isoniazid, Alcohol, Digoxin. And Paracetamol (less common).
- **Diarrhea.**
- Renal insufficiency of any cause.
- Addison's Disease

Metabolic Alkalosis

- Drugs: ACEi, NSAIDs (e.g. Diclofenac), Diuretic Therapy.
- **Vomiting (due to the loss of gastric acid → Alkalosis)**
- Hypovolemia, Hypokalemia.
- 2ry Hypoparathyroidism.

Respiratory Acidosis

- Any cause of airway obstruction "**apnea**" (Low RR).
- Drugs: **Benzodiazepines, Organophosphates.**
- COPD
- Pneumothorax, hemothorax, ascites.
- N.B. If a patient is on a ventilator and developed respiratory acidosis → **Increase the ventilation** to washout the CO₂ (the acid).

Respiratory AlkalosisANY CAUSE OF **HYPERVENTILATION** (High RR) e.g.

- **PE** (Pulmonary Embolism)
- Salicylate -**Aspirin**- (**early** in the course of poisoning).
- Mechanical Ventilation (**Rapid Ventilation**).
- **Panic attack** (Hyperventilation → washing CO₂)

N.B. A patient with **cardiac arrest** can develop → **MIXED ACIDOSIS** → (**Low pH**, **High PaCO₂**, **Low HCO₃**) as he is not breathing (accumulation of CO₂, and his kidneys do not perfuse due to low cardiac output). What to do?

→ **Increase ventilation.**

(This will rapidly washout the CO₂ which is Acid and help resolve the acidosis)

Example (1):

pH 7.17 (Normal: 7.35-7.45)

PCO₂ 2.5 (Normal: 4.7-6 kPa)

Base excess -14 (Normal -2 to +2)

→ **Metabolic acidosis** (with partial respiratory compensation).

♦ As the pH < 7.35 → definitely **Acidosis**.

♦ PCO₂ (the acid) is low → this is a **compensation** by the lungs; they try to breathe quickly to get rid of the CO₂ (the acid) to buffer the acidity. The patient might present with tachypnea or SOB.

♦ Base excess is very low → **metabolic acidosis**.

Example (2):

An elderly man was found on the floor unconscious by his neighbours. The ambulance crew came. His Systolic BP was 65mmHg. He was resuscitated in the ambulances (given 1.5 L NaCl 0.9%). He was further resuscitated in the emergency department. He mentions that he had severe diarrhea over the last 2 days. His labs show:

pH 7.18 █ Base excess -13 █ Lactic acid 6 (high)

Urea and Creatinine are high █ CRP 160 (high)

His blood gas interpretation → **Metabolic Acidosis**

As his pH < 7.35 → **Acidosis**

His Base excess is very low (< -2) → **Metabolic Acidosis**.

This patient had profuse diarrhea for 2 days. Remember that profuse diarrhea can lead to loss of HCO_3 "Bicarbonate" and thus metabolic acidosis.

Also, remember that profuse diarrhea can lead to → **Hypovolemia** "Dehydration", which is an important prerenal cause for **AKI**. That's why his renal functions are impaired.

Example (3):

A 28 YO has been having shortness of breath for the last 16 hours and is feeling unwell. His arterial blood gas show:

pH 7.51 ■ PaO_2 8 (normal is > 10) ■ PaCO_2 3.1 (Normal 4.6-6)
Bicarbonate 20 (normal 22-26).

The likely Dx → **Respiratory Alkalosis**

(SOB → ↑ RR → getting rid of CO_2 which is an acid → resp. alkalosis)

Noe that:

Respiratory Alkalosis can be seen in **Pulmonary Embolism**

And in **Panic attack**

However, the associated decrease in PaO₂ "Hypoxia" suggests **PE**.

Very Important,

Respiratory Acidosis (pH <7.35):

e.g. → **Asthma, COPD**

Low or normal PaO₂, High PaCO₂ (>6), bicarb is normal (22-26) or around it.

Respiratory Alkalosis (pH >7.45) in: (Asked twice in recent exams)

☐ **Pulmonary Embolism:**

Low PaO₂ (<10), Low PaCO₂ (<4.7), bicarb is normal (22-26) or around it.

☐ In **Panic attack**, it is the same, but the PaO₂ will be normal (>10):

Normal PaO₂ (>10), Low PaCO₂ (<4.7), bicarb is normal (22-26) or around it.

Example (4):

A patient in cardiac arrest on mechanical ventilation was found to have pH 7.1, pCO₂ 8.5, HCO₃ 18. What to do?

This a picture of mixed acidosis (low pH, high PaCO₂, low bicarb). The ventilation needs to be increased to wash out the excess of CO₂ “the acid”.

→ **Increase ventilation.**

Example (5):

A patient is brought to the A&E after ingesting many tablets of an unknown medication. He has chest and abdominal pain, palpitations, nausea and altered mental status. His pH is 7.22, PaCO₂ is 3, bicarbonate is 18. What is the likely medication taken?

✓ Metabolic acidosis + partial respiratory compensation

✓ S&S suggesting aspirin overdose

→ **Aspirin** (remember MALLAD → metabolic acidosis).

MALLAD = Metformin, Aspirin, Iron, Isoniazid, Alcohol, Digoxin)

Key
58

Sepsis

- **Sepsis:** life-threatening organ dysfunction caused by a dysregulated host response to infection.
- **Septic shock:** a more severe form of sepsis, technically defined as '*in which circulatory, cellular, and metabolic abnormalities are associated with a greater risk of mortality than with sepsis alone*'
- The old term: **Severe sepsis** and 'Systemic Inflammatory Response Syndrome (SIRS)' are no longer used.

Adult patients outside of ICU with suspected infection are identified as being at **heightened risk of mortality** if they have quickSOFA (qSOFA) score meeting ≥ 2 of the following criteria:

qSOFA score

Respiratory rate $> 22/\text{min}$

Altered mentation

Systolic blood pressure $< 100 \text{ mm Hg}$

Management of Sepsis

Red Flag criteria of Sepsis

- Responds only to voice or pain/ or **unresponsive**.
- Acute confusional state.
- **Systolic B.P ≤ 90 mmHg** (or drop >40 from baseline).

- Heart rate > 130 per minute.
- Respiratory rate ≥ 25 per minute.
- The patient requires oxygen to keep SpO₂ $\geq 92\%$.
- Non-blanching rash, mottled/ ashen/ cyanotic.
- Not passed urine in last 18 h/ UO < 0.5 ml/kg/hr.
- Lactate ≥ 2 mmol/l.
- Recent chemotherapy.

If any of the red flags are present

→ the **“Sepsis Six”** should be started straight away, which are:

Give 3 → O₂, IV fluids, IV Abx

- High flow O₂.
- IV Fluids: NICE recommend a bolus of 500ml crystalloid over less than 15 minutes.
- IV broad spectrum Antibiotics.

Take 3:

- Blood Cultures.
- Full blood count, U&E, Clottings, Lactate.
- Start monitoring UOP (Urine Output) hourly.

The patient is to be ADMITTED with in-patient management.

Notes:

- Sepsis may lead to → **acute kidney injury** (oliguria, ↑ serum urea, creatinine).
- The patient with sepsis may develop **metabolic acidosis** (low pH, low bicarbonate) due to sepsis (acid load). However, it is more important to treat the [CAUSE] of sepsis (which is infection) with antibiotics than administering sodium bicarbonate.
- If the patient's BP failed to respond to IV fluid (ie, persistent HYPOTENSION despite appropriate IV fluid)
→ This is called → **Septic Shock**. Otherwise, it is sepsis.

Scenario (1):

A 44-year-old man presents to the ER with breathlessness and fever. He has been having cough for the past few days. His temperature is 40.2 C. His pulse rate is 122, blood pressure is 110/82, respiratory rate is 25. He has been started on 15L of oxygen and IV fluids (Hartman's solution).

His ABG shows:

Low pH (7.2), pO₂ (normal), PaCO₂ (low),

Bicarbonate (low), Lactate 9 (high).

What is the most appropriate management?

This man has sepsis. He also has 2 red flags of sepsis:

- Respiratory rate is ≥ 25 .
- lactate is > 2 mmol/L.

→ The **“Sepsis Six”** should be started straight away:

As you see, the first 2 were started in the stem (O₂ and IV fluid). Thus, the next step is to **administer IV antibiotics**.

This patient also has metabolic acidosis (low pH, low bicarbonate) due to sepsis (acid load). However, it is more important to treat the [CAUSE] of sepsis (which is infection) with antibiotics than administering sodium bicarbonate.

Key
59

Tricyclic Antidepressant Overdose (eg, Amitriptyline) potentially life-threatening

Dilated pupils – Dry mouth – Dry flushed skin – Drowsiness – Hypotension – Urine retention – Severe Sedation – Tachycardia – Widened QRS

☐ **ECG monitoring is essential**: amitriptyline toxicity can lead to tachyarrhythmias, **Widened QRS**, PR, QT and **Broad complex tachycardia**.

☐ The most important immediate action → **ECG Monitoring**

☐ As the patient is in severe **Metabolic Acidosis** (ie, pH < 7.35 | $\text{HCO}_3^- < 22$)

→ Give **IV fluid bolus** normal saline (0.9% NaCl)

+ **Sodium Bicarbonate** 50 ml of **8.4%** slow IV injection

Important Note: In TCA toxicity- eg, amitriptyline overdose: There could be **hyperkalemia** resulting from the **metabolic acidosis** → Give **IV fluids and IV sodium bicarbonate** to treat the metabolic acidosis and therefore the hyperkalemia would resolve. So, pick IV sodium bicarbonate Instead of calcium gluconate.

Key 60 A patient was given IV antibiotic (Co-Amoxiclav) for pneumonia and shortly after, she developed wheezes, Tachycardia, Severe Hypotension, Generalized itchy rash.

→ The likely Dx → **Anaphylaxis**.

→ The treatment → **IM Epinephrine (Adrenaline)**.

Age	IM Adrenaline (Epinephrine)
< 6 months	150 micrograms (0.15ml 1 in 1,000)
6 months – 6 years	150 micrograms (0.15ml 1 in 1,000)

6-12 years	300 micrograms (0.3ml 1 in 1,000)
Adult and child > 12 years	500 micrograms (0.5ml 1 in 1,000)

Note: If there were **no** severe drop in BP, SOB, Wheezes

→ IV **Chlorpheniramine** (Antihistamine) and **Hydrocortisone** would be enough as this will be an **allergic reaction**, not Anaphylactic shock.

Remember **the Indications of IM Adrenaline (Anaphylaxis)**:

SOB ■ Stridor ■ Hoarseness ■ Wheezes ■ Shock ■ Swelling of tongue, face, cheek

Key
61

The Protective Mechanism (Physiology) of Hypovolemic Shock

- **Early:** loss of blood volume → stretch the receptors in the atria and the baroreceptors in the aorta become activated → vasomotor centre stimulates efferent output → increase the **release of catecholamines** → **Increased SYMPATHETIC Activity** → Vasoconstriction, Arteriolar constriction and **Tachycardia** (To maintain blood).

- **N.B.** Sympathetic activity also causes **cold** and clammy **peripheries**.

- **Late:** Decreased GFR → activation of Aldosterone and ADH → Salt and water reabsorption (retention) → activation of thirst centre.

(To maintain the Volume).

Key 62 Staphylococcal (Toxic Shock Syndrome)

Staphylococcal toxic shock syndrome describes a severe systemic reaction to staphylococcal exotoxins (Staph. Aureus).

Diagnostic criteria

- Fever: temperature > 38.9°C.
- Hypotension: systolic blood pressure < 90 mmHg.
- **Diffuse erythematous rash.**
- **Desquamation** of rash, especially of the **palms** and **soles**.
- Involvement of **three or more organ** systems: e.g.
 - Gastrointestinal (**diarrhoea** and **vomiting**, **Abdominal pain**),
 - Mucous membrane erythema,
 - CNS involvement (e.g. **confusion**)

- Renal failure,
- Hepatitis,
- Thrombocytopenia,
 - [High WBC and Low Platelets <100.000]

Example:

A 72-year-old woman with Hx of URTI last week develops confusion, fever (39°C), hypotension (82/60), vomiting, abdominal pain, consolidation at the right lung base. Her Labs: Hb: 120, WBC: 19, Platelets: 90,000

→ **Toxic Shock Syndrome (Staphylococcal).**

- Fever.
- Hypotension.
- High WBCs and Low Platelets (<100,000).
- More than 3 organs or systems → **CNS** (Confusion) / **Lung** (consolidation) / **GIT** (Vomiting and Abdominal pain).



Key
63

Splenic Rupture

- Common after trauma to the **left side** especially after **RTA**. (**imp v**)
- **Manifestations:** Left side Chest and Abdomen **Bruises**, Abdominal **Distension**, **rapid fall in BP** and **rise in HR**.
- Others → abdominal tenderness, decreased bowel sounds.
- Abdominal X-ray → **Absent left psoas shadow**.
- FAST (U/S for trauma) → **free peritoneal fluids**.
- CT Abdomen → **Diagnostic**
- If confirmed → **Urgent surgery**.
- **Note:** **Subsplenic hematoma** is different from **Splenic rupture**. The former might be treated conservatively “if stable” by being **observed by**

the surgical team whereas the latter (Splenic rupture) if confirmed by CT, **urgent surgery** is required.

Key
64

Remember:

Adrenaline in anaphylaxis is ALWAYS given **Intramuscularly (IM)**.

Key
65

In **penetration** or **blunt trauma** to any organ (e.g. **liver**), if there is low BP (suspecting internal hemorrhage),

→ the patient needs to be **resuscitated and stabilised before sending for CT or Surgery**.

→ This can be achieved by **IV fluids**.

→ If still low BP after IV fluid → **Cross-match for Blood transfusion**.

→ After that, **CT Abdomen** can be performed and **Surgery** might take place.

[Do not rush into CT abdomen if SBP is still low! Stabilise the patient first!]

IV fluids, still hypotensive? → **Cross-match for blood transfusion**

→ **CT abdomen** → **Surgery (Laparotomy)** if indicated.

Key
66

Test Your Knowledge on a Previous Topic

A girl with paracetamol overdose presented 2 hours after ingesting paracetamol. When will be the appropriate time to measure her serum paracetamol level?

→ **In 2 hours.**

We know that plasma paracetamol level is measured **4 hours “after ingestion”**. This girl has ingested the paracetamol 2 hours ago. So, the remaining time to reach the 4 hours is → 2 hours.

Key
67

Chest pain that is aggravated by **inspiration** and **does not relieve by GTN**, with **Normal ECG**, with No FHx of Cardiac diseases

→ Think of **Costochondritis**.

Costochondritis

- The patient is usually over 40 Y/O.
- The chest pain is sharp or Aching.
- The pain is aggravated by movements (e.g. coughing, sneezing, inhalation).
- Tenderness on palpation over the sternal sides of the chest.

- The diagnosis is clinical.
- Rx → self-limiting. Mild analgesics such as NSAIDs can be given.

Note from the Cardiology chapter,

The chest pain that ↑ on inspiration and is relieved by bending forwards is suspicious for **Pericarditis** (especially if there is a Hx of MI recently).

Key
68

Remember, in **sepsis** (when there are any of the red flags) →

Give 3 → O₂, IV fluids, IV antibiotics.

Take 3 → Blood culture ■ U&E, FBC, Clotting, Lactate ■ monitor Urine Output.

Any patient with infection (e.g. pneumonia) who develops any of the following red flags, we activate the above “Sepsis Sex”. However, we start with O₂ and IV fluids before the others.

Red Flags for Sepsis:

- Responds only to voice or pain/ or unresponsive.
- Acute confusional state
- **Systolic B.P ≤ 90** mmHg (or drop >40 from normal)
- **Heart rate > 130** per minute

- **Respiratory rate ≥ 25** per minute
- Needs oxygen to keep $SpO_2 \geq 92\%$
- **Non-blanching rash**, mottled/ ashen/ cyanotic
- Not passed urine in last 18 h/ **UO < 0.5 ml/kg/hr**
- **Lactate ≥ 2 mmol/l**
- Recent chemotherapy

Key
69

Remember,

In an **Unstable Patient** (e.g. **Hypotensive...**), who presents with **hematemesis**, we need to resuscitate him (**Give IV fluids**) **before Endoscopy!**

Pay Attention,

If the question mentions that the patient has been given “the initial management” or has been given “IV fluid”, the next step would then be → **Emergency Endoscopy for Band Ligation.**

Key
70

The word **“Rigors”** indicates:

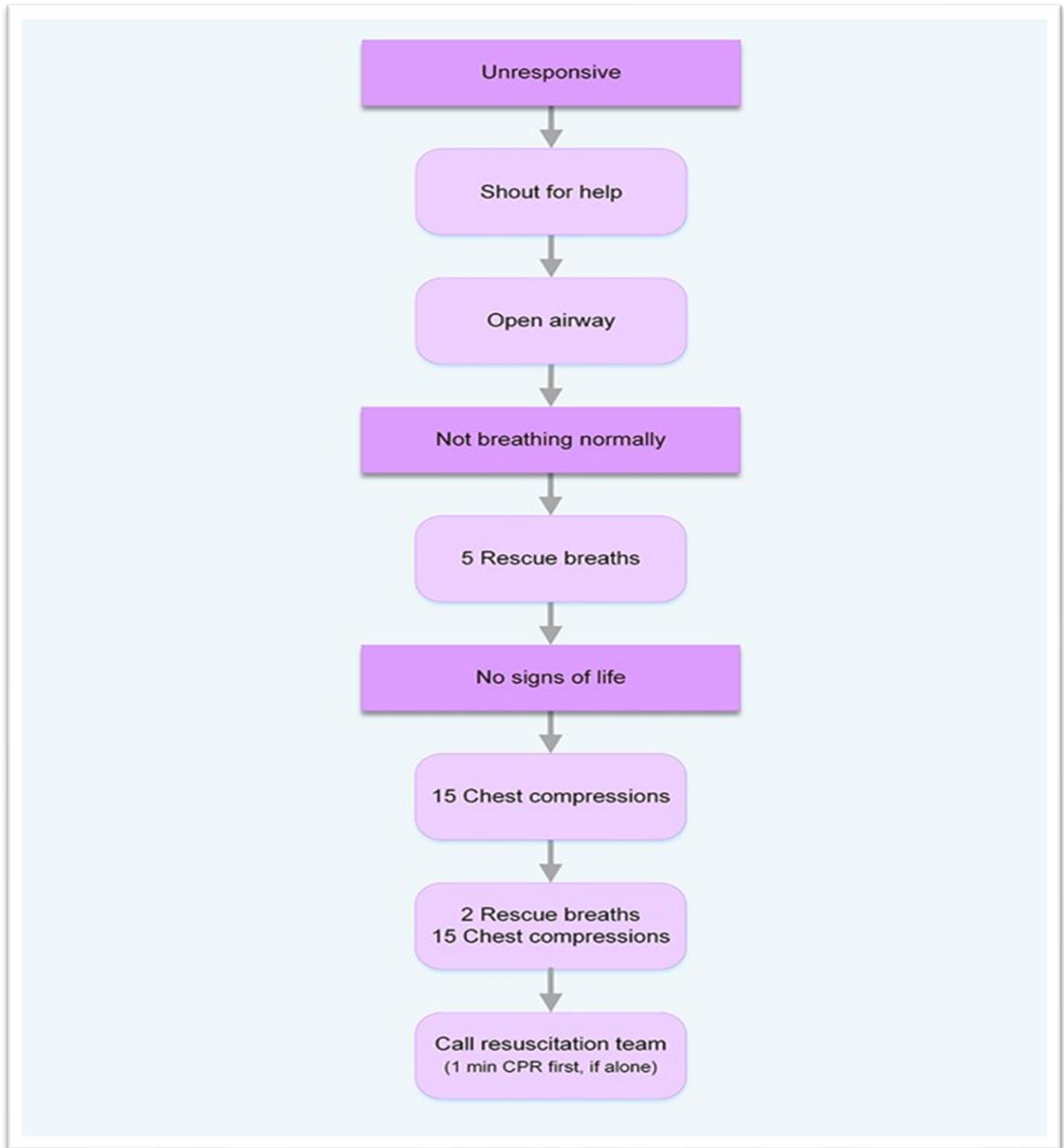
- **Bacteremia** (e.g. *biliary sepsis*, *pyelonephritis sepsis*). OR
- **Malaria.**

Example: An elderly woman with Hx of UTI and Gallstones. Presents with fever (38.9°C), Hypotension (88/58), HR 130, RR 24.

	<p>She has rigors and right upper abdominal pain. Urine dipstick is Negative for WBCs and Nitrates.</p> <p>→ Sepsis (likely Biliary Sepsis due to bile duct obstruction)</p> <p>☐ It is not UTI (as urine dipstick is -ve for WBCs and Nitrates).</p> <p>☐ It is not septic shock (as IV fluid was not given. If IV fluid was given and the patient remains hypotensive → Septic shock)</p>
Key 71	<p>A young lady with recurrent attacks of palpitations, tremors, anxiety, and nervousness that develop rapidly and resolve in a few minutes.</p> <p>→ Panic Attacks.</p> <p>☐ Note, this is not GAD (Generalised Anxiety Disorder) as the symptoms develop rapidly and resolve in a few minutes.</p> <p>☐ Note, not all cases of panic attacks have to present with the classical features of Dizziness, circumoral paraesthesia and tingling, carpopedal spasm.</p> <p>☐ Treatment involves Simple <u>breathing exercise</u> such as breathing through nose, paper bag, slowing down breathing + <u>Reassurance</u>.</p> <p><u>Others, in severe and acute (still ongoing):</u> Benzodiazepines + Propranolol (if no Asthma).</p> <p>☐ The usual Answer in PLAB → Rebreathe into a paper bag.</p>

Key
72

Paediatric basic life support algorithm (Healthcare professionals with a duty to respond)



<p>Key 73</p>	<p>☐ Very Important:</p> <p>If a patient with liver disease presents with Hematemesis and high INR → Give Fresh Frozen Plasma (FFP).</p> <p>However, if the question asks about the most appropriate “initial” step, the answer would be → IV fluid.</p>
<p>Key 74</p>	<p>TCA (Tricyclic Antidepressant) Overdose (eg, Amitriptyline)</p> <p>☐ Excessive sedation, Dry mouth and skin.</p> <p>☐ Sympathomimetic effect: tachycardia, Sweating, Dilated Pupils.</p> <p>☐ ECG: Sinus tachycardia (Common), Prolongation of QRS, QT, PR</p> <p>Dilated pupils – Dry mouth – Dry flushed skin – Drowsiness – Hypotension – Urine retention – Tachycardia – Severe Sedation</p> <p>☐ ECG monitoring is essential: Widened QRS, PR, QT and Broad complex tachycardia (tachyarrhythmias).</p>

☐ As the patient is in severe **metabolic Acidosis**

→ **give an IV bolus of 250 ml Normal Saline (0.9%)**

+ Sodium Bicarbonate (50 mmol IV slowly).

In a recent exam, the answer was:

Give IV fluid Bolus (0.9% NaCl) + IV Sodium Bicarbonate 50 ml of 8.4%

Also, in a recent exam, the patient was already given IV fluids and he had both **hyperkalemia** and **metabolic acidosis**.

The options included both (**calcium gluconate** – to correct hyperkalemia- and **sodium bicarbonate** – to correct metabolic acidosis-).

The more suitable answer is to give **sodium bicarbonate**.

If you treat metabolic acidosis, it is expected that hyperkalemia would resolve.

♠ **N.B.** aim for pH of 7.5-7.55!

♠ Sodium bicarbonate will correct ECG changes and cardiac rhythm.

♠ Do not forget that in a patient with amitriptyline (TCA) overdose, if he is acidotic, 2 steps are to be done:

1) ECG monitoring.

2) IV fluids including Sodium Bicarbonate (HCO_3).

Important Note: In TCA toxicity- eg, amitriptyline overdose: There could be **hyperkalemia** resulting from the **metabolic acidosis** → Give **IV fluids and IV**

sodium bicarbonate to treat the metabolic acidosis and therefore the hyperkalemia would resolve. So, pick IV sodium bicarbonate Instead of calcium gluconate.

Key
75

Renal Trauma

- A fall from a height onto the loin or flank can cause tearing of blood vessels at the renal pedicle or rupture the ureter at the pelvi-ureteric junction → **Haematuria**.
 - ± **bruises** on the **flank** + **Hypotension**.
 - Initially, stabilise the patient with **IV fluid** before sending him for CT abdomen.
 - Dx → **Urgent CT Abdomen** (this has replaced the Intravenous urogram (IVU)).
 - If CT is not within the options → **IVU or FAST (whichever is present)**
- In Acute Renal Trauma, The Abdomen CT is the Investigation of Choice.*

Key
76

After sustained a trauma, a man presents with hematuria.

→ **CT Abdomen**

- A fall from a height onto the loin or flank can cause tearing of blood vessels at the renal pedicle or rupture the ureter at the pelviureteric junction → **Haematuria**.
- ± **bruises** on the **flank** + **Hypotension**.

	<p>Initially, stabilise the patient with IV fluid before sending him for CT abdomen.</p> <p>Dx → Urgent CT Abdomen (this has replaced the Intravenous urogram (IVU)).</p>		
Key 77	<p>A young man presents with abdominal pain, runny nose (rhinorrhea), watery eyes, sweating and agitation.</p> <p>These are likely features of → Heroin withdrawal.</p> <p>Careful, withdrawal is different from overdose (toxicity)!</p> <p>Remember:</p> <table border="1"> <tr> <td>Heroin toxicity</td><td> <ul style="list-style-type: none"> - Respiratory Depression (Low RR) - Low BP - Low HR - Pinpoint pupils (constricted pupil) - Constipation • Give Naloxone </td></tr> </table>	Heroin toxicity	<ul style="list-style-type: none"> - Respiratory Depression (Low RR) - Low BP - Low HR - Pinpoint pupils (constricted pupil) - Constipation • Give Naloxone
Heroin toxicity	<ul style="list-style-type: none"> - Respiratory Depression (Low RR) - Low BP - Low HR - Pinpoint pupils (constricted pupil) - Constipation • Give Naloxone 		

	Cocaine toxicity	<ul style="list-style-type: none"> - High RR - High BP - High HR - Mydriasis (dilated pupils) - Hyperthermia and sweating - Restlessness and Agitation <p>Initial Management → Benzodiazepines (eg, lorazepam).</p>
	LSD (Lysergic Acid Diethylamide)	<p>Mydriasis – Flushing and sweating – Hyperreflexia-Diarrhea – Paraesthesia</p> <p>Delusions and Hallucinations (Pathognomonic)</p> <ul style="list-style-type: none"> - a patient smelling colours and seeing sounds → LSD
Key 78	<p>A grandmother was found unconscious. HR is 52, RR is 6. His pupils are constricted (pinpoint).</p> <p>The likely diagnosis → Heroin (Opioid) overdose.</p> <p>The initial step → Give Naloxone</p>	

Key 79 After ingesting his grandfather medication, a young male presents with dilated pupils, drowsiness, dry mouth and skin. ECG shows Wide QRS.

→ Features of TCA “amitriptyline” overdose.

→ IV fluids + Sodium Bicarbonate 50 ml of 8.4% IV.

✓ ECG monitoring is essential (sinus tachycardia, Wide QRS, QT)

✓ ABG will mostly show metabolic acidosis.

✓ IV fluid 250 ml Bolus (0.9% NaCl) +

✓ IV injection of Sodium Bicarbonate 50-100 ml of 8.4% slowly

(50 mmol Sodium bicarb is given by slow IV injection)

(TCA eg, amitriptyline toxicity needs ECG + IV fluid + Sodium Bicarbonate).

Key 80 Unresponsive Hypoglycemic man

80

→ 75 ml of 20% IV Glucose

Diabetic patient suddenly collapsed and fell unconscious

→ measure **Random Blood Glucose**.

If blood sugar is **below 4** → It is **hypoglycemia** (*tachycardia, sweating, confusion, altered mentation*)

In-Hospital Management of Hypoglycemia (Summary):

- If the patient is **confused but able to swallow** → **glucose gel** (can be squeezed into the mouth between the teeth and gums).
- If the patient is **confused and unable to swallow** → **IM glucagon** or if there is already an IV line then give IV glucose.

Sometimes, a question will not tell you if the patient is able to swallow or not. However, you may find in the stem that the patient has been vomiting. Thus, he cannot swallow (cannot tolerate orally).

Causes of hypoglycemia: alcohol and liver failure (impaired gluconeogenesis), Excess paracetamol, aspirin, sulphonylureas (e.g. glibenclamide).

Key
81

Orbital Blowout fracture

- The commonest bone affected → **Maxilla** (Orbital floor).

- Followed by → Ethmoid (Medial wall).

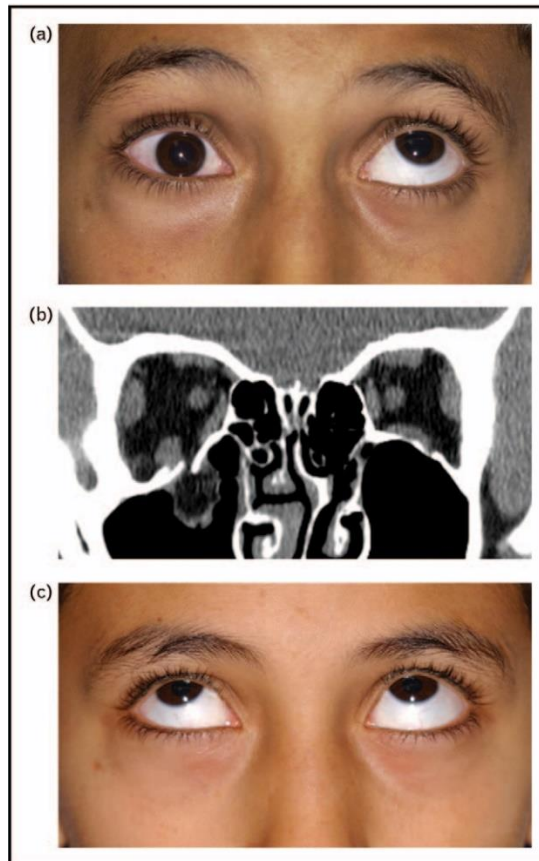
One of the manifestations:

- **Diplopia on upward gaze** → due to impingement of the **Inferior Rectus Muscle**.

How?

→

“When the affected eye tries to look up, the inferior rectus that is trapped in the fracture will prevent it. On the other hand, the other “Intact” eye will look up normally. Imagine what will be the result of this? One eye is looking up while the other up is not. True! **Diplopia!**”



Key
82

Post-hemicolectomy, a patient was commenced on parenteral morphine for pain. 2 days later, he developed SOB with RR of 30 and O2 saturation of 87%.

The most appropriate management

→ **Commence O2 by face mask immediately.**

(ABC: Airways, breathing, circulation).

Remember that (opioid toxicity → ↓ RR -resp. depression-).

Here, ↑ RR.

Key
83

■ Opioid (e.g. Heroin) overdose → give **Naloxone**.

- Respiratory Depression (**Low RR**)
- **Low BP**
- **Low HR**
- **Pinpoint pupils** (constricted pupil)
- Constipation

	<p>→ Heroin (opioid) toxicity → Give Naloxone.</p> <hr/> <p>■ Opioid (e.g. Heroin) wants to quit opiate, the drug that helps him combat withdrawal symptoms → Methadone</p> <p><i>Methadone is the Method number 1 for (detoxification); reducing withdrawal symptoms in opioid addicts</i></p>
Key 84	<p>■ A man was sitting on the passenger seat when the car went into a road traffic accident. He was hit in the left side.</p> <p>The most commonly injured organ is → Spleen. Sept 2019 question.</p>
Key 85	<p>■ A young adult was found outside a local pub with semiconscious level, profuse sweating, diaphoretic skin, GCS 12/15, tachycardia, hypotension.</p> <p>First Ix → serum glucose (alcohol induces hypoglycemia)</p> <p>Remember, in the case of alcohol-induced hypoglycemia, glucagon is ineffective. So, if the patient is able to swallow, give fruit juice or 2 tubes of</p>

	glucose gel. If confused and unable to swallow (eg, vomiting, not responsive) then insert IV access and give IV glucose.
Key 86	<p>■ A patient is brought to the A&E by his friends from party. He was seen taking some substance. RR 6, hypotension, pupils are constricted.</p> <p>→ Heroin toxicity.</p> <p>→ Give Naloxone.</p>
Key 87	<p>A 57-year-old male builder, has had pain in the left flank for 4 hours. He is a known diabetic and has been drug compliant.</p> <p>Temp 36.7 ■ Pulse 90b/m ■ BP Normal.</p> <p>Based on the image, what is the likely cause of this?</p> <div data-bbox="441 1257 1266 1797" data-label="Image"> </div>

	<p>a. blunt force trauma</p> <p>b. herpes zoster</p> <p>c. erythema ab igne</p> <p>d. old thoracotomy scar</p> <p>e. fixed drug eruption</p>
Key 88	<p>A 97yr old man, 7 days of reduced oral intake, increased confusion. Has dementia and DM. Pulse rate is 98b/m, BP on lying down is 110/55mmHg, sitting BP is 84/50mmHg. Skin turgor is decreased. Na⁺ = 152, K⁺ normal, Bicarbonate reduced, Urea increased, hyperglycaemia. What's d appropriate fluid to give?</p> <p>A. 0.9% NaCl (Hypovolemic Hypernatremic: Dehydration- start with IV normal Saline (0.9% NaCl) to compensate the dehydration (to correct the hypovolemia). 0.9% NS would also correct the high Na⁺ gradually)</p> <p>B. 0.45 % NaCl (Not advised, rapid correction of hypovolemia with hypotonic solution increases the risk of cerebral edema).</p> <p>C. 0.18% NaCl + Dextrose (He has high blood glucose, dextrose is contraindicated).</p>

Key 89 A 54 yr old man had a cardiac arrest and was successfully resuscitated following defibrillation. He was then admitted to ICU on ventilation. HR 120 bpm. BP: 90/65mmHg.

The following ABG values: pH: 7.04 ■ pO₂: 12kpa ■ pCO₂: 9.5kPa (high), bicarbs: 19 (low)

What is the most important immediate step?

- A. Fluid challenge
- B. Increase fiO₂
- C. **Increase ventilation**
- D. Start inotropes
- E. Start bicarbonate

This patient with **cardiac arrest** developed → **MIXED ACIDOSIS** → (Low pH, High PaCO₂, Low HCO₃) as he is not breathing (accumulation of CO₂, and his kidneys do not perfuse due to low cardiac output). What to do?

→ **Increase ventilation.**

(This will rapidly washout the CO₂ which is Acid and help resolve the acidosis)

Key
90

A 54 YO man who Lost his wife months back, currently being treated for depression was brought to the hospital following intake of some drugs. He has nausea, vomiting and ringing ears. His temp is 39°C. What is the likely cause of his symptoms?

- a) **Aspirin**
- b) Lithium
- c) Paracetamol
- d) Thyroxine
- e) diazepam

Aspirin Poisoning Manifestations

■ The earliest symptoms of acute aspirin poisoning may include

✓ **Ringing in the ears (tinnitus).**

✓ Impaired hearing.

■ More clinically significant signs and symptoms may include

✓ **Rapid breathing** (hyperventilation), (leading initially to resp. alkalosis but later on metabolic acidosis develops).

✓ **Nausea and vomiting,**

	<p>✓ Dehydration,</p> <p>✓ <u>Fever</u>,</p> <p>✓ Double vision,</p> <p>✓ Feeling faint.</p> <p>✓ Abd. Pain.</p> <p>Ring in the ears (Tinnitus) → suspect Aspirin overdose.</p> <p>Mnemonic → AspiRIN (RINgin).</p>
Key 91	<p>A 43 YO woman has eaten in a restaurant and presented with BP 80/50, stridor and bilateral polyphonic wheeze. What is the initial management?</p> <p>A. IM Epinephrine</p> <p>B. IV fluid</p> <p>C. IV hydrocortisone</p> <p>D. IV chlorpheniramine.</p> <p>This is not just a case of allergic reaction! The patient is going into Anaphylaxis (Wheezes, Stridor, severe Hypotension) for which we give IM adrenaline (epinephrine).</p> <p>If simple allergic reaction (e.g., only rash)</p>

→ IV **Chlorpheniramine** (antihistamine) ± IV **hydrocortisone** (steroids).

☐ **Symptoms of anaphylaxis**

usually involve more than one part of the body such as the **skin, mouth, eyes, lungs, heart, gut, and brain**. Some symptoms include:

- Skin rashes and itching and hives (Urticarial Rash).
- **Swelling** of the lips, tongue or throat.
- **Shortness of breath, trouble breathing, wheezing** (whistling sound during breathing), Cough, Cyanosis.
- **Dizziness** and/or fainting.
- Stomach pain, vomiting or diarrhea.

♠ Adrenaline can be repeated **every 5 minutes** if necessary. The best site for **IM** injection is the **anterolateral aspect of the middle third of the thigh**.

♠ After giving Adrenaline, give Hydrocortisone and Chlorpheniramine.

Note: **Adrenaline is ALWAYS given Intramuscularly.**

What if it is a simple allergic reaction (eg, only rash)?

→ Do **not** pick IM epinephrine (unless SOB, difficulty breathing, wheezes...etc).

What if it is a simple allergic reaction -only rash- but you have to choose between (Oral antihistamine eg, **oral chlorpheniramine**) and (**IV hydrocortisone**)?

→ Pick **oral chlorpheniramine (oral antihistamine)**.

Antihistamine first (either oral or IV), then (IV hydrocortisone).

Key 92 22 YO man admitted for about 8 hrs. He has been having abdominal pain, agitation and is sweaty. Reason for symptoms?

- A. Paracetamol toxicity
- B. ecstasy overdose
- C. **Opiate withdrawal**

Drug Withdrawal Features

Heroin

- Withdrawal begins 12 hours after last dose
- Peaks at 24-48 hours
- **Increased body secretions:** **sweating**, diarrhea, runny nose, tearing (Flue-like symptoms esp. early in withdrawal) +
- **Pain:** **Abdominal pain**, joints (**arthralgia**), muscle aches. +
- **Others:** **agitation**, insomnia, anxiety (common in other drugs)

	Benzo-diazepines	<ul style="list-style-type: none"> - Withdrawal begins 1-4 days and peaks at 2 weeks. - Panic attacks + Other common (agitation, insomnia, anxiety) <p>Remember: benzodiazepines are used to treat panic attacks and anxiety.</p>
	Cocaine	<ul style="list-style-type: none"> - Within hours of last dose and peaks in a few days. - Depression, irritability, muscle aches + Others (insomnia ...)
Key 93	<p>Young patient with abdominal cramp, blurring of vision and coloured distortion etc (features classical of Ecstasy). What drug is misused?</p> <p>a. Heroin</p> <p>b. Ecstasy</p> <p>c. Cocaine</p>	
	LSD Overdose	<p>Mydriasis (Dilated pupils) – Flushing and sweating – Tremors – Hyperreflexia-Diarrhea – Paraesthesia</p> <p>Delusions and Hallucinations (Pathognomonic)</p> <ul style="list-style-type: none"> - a patient smelling colours and seeing sounds → LSD <p>Patients see colours when their eyes are closed.</p>

	<table border="1"> <tr> <td data-bbox="118 201 354 283"></td><td data-bbox="354 201 1593 283"></td></tr> <tr> <td data-bbox="118 283 354 768"> Ecstasy Overdose </td><td data-bbox="354 283 1593 768"> <p>Agitation, confusion, flushing, Hyperthermia, Tachycardia, Tachypnea, Thirst, rigidity.</p> <p>Seeing spots of colour around peripheral vision (when eyes are open).</p> </td></tr> </table>			Ecstasy Overdose	<p>Agitation, confusion, flushing, Hyperthermia, Tachycardia, Tachypnea, Thirst, rigidity.</p> <p>Seeing spots of colour around peripheral vision (when eyes are open).</p>
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<p>Key 94</p>	<p>A question about a patient having respiratory depression after Surgery and having pinpoint pupil. He was on Morphine. Initial Management?</p> <p>→ Give Naloxone</p> <table border="1"> <tr> <td data-bbox="118 1299 418 1833"> Heroin (Morphine) Overdose </td><td data-bbox="418 1299 1593 1833"> <ul style="list-style-type: none"> - Respiratory Depression (Low RR) - Low BP - Low HR - Pinpoint pupils (constricted pupil) - Constipation • Give Naloxone </td></tr> </table>	Heroin (Morphine) Overdose	<ul style="list-style-type: none"> - Respiratory Depression (Low RR) - Low BP - Low HR - Pinpoint pupils (constricted pupil) - Constipation • Give Naloxone 		
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Key 95	<p>A known asthmatic child has been breathless for over 12hours. He has Oxygen saturation of 86% on high flow Oxygen. His chest is silent. What is the most appropriate initial management?</p> <p>A. IV aminophylline B. IV magnesium sulphate C. Intubate and ventilate D. CPAP</p> <p>Desaturating (Despite High Flow O2), Silent Chest → Going into Resp. Failure → Intubate</p>
Key 96	<p>A Post-op patient (e.g. in LL femoral arteries) develops LL swelling + is going into shock (Hypotensive) → Think of a hemorrhage at the site of the swelling and INITIALLY and IMMEDIATELY → APPLY PRESSURE at the site of the swelling even before giving IV fluid as there is most likely bleeding beneath it.</p> <p>80-year-old woman post coronary angiography and placement of 2 stents, stent was removed later and started having abdominal pain and left groin swelling. What is appropriate initial management?</p>

	<p>A) Apply pressure on the swelling</p> <p>B) CT scan</p> <p>C) IVF 0.9NS</p> <p>D) FFP</p>				
Key 97	<p>A man has just got out of the theatre for cholecystectomy. Vitals are stable except BP which is 90/50. Pulse is 120. What is the <u>next</u> step to carry out?</p> <p>a. Fluid challenge</p> <p>b. Adrenaline</p> <p>c. Dopamine</p> <p>Likely reactionary hemorrhage.</p> <p>He is hypotensive. The (initial) = (next) step is IV fluid.</p> <p>Remember:</p> <p>Types of Surgical Bleeding</p> <table border="1"> <tr> <td>Primary hemorrhage</td><td>Bleeding at the time of surgery.</td><td>Rx: Replacing Blood or return to theatre if severe.</td></tr> </table>		Primary hemorrhage	Bleeding at the time of surgery.	Rx: Replacing Blood or return to theatre if severe.
Primary hemorrhage	Bleeding at the time of surgery.	Rx: Replacing Blood or return to theatre if severe.			

Reactionary hemorrhage	<p>Bleeding within 24 hours after surgery/ Trauma.</p> <p>e.g. a patient bleeding and hypotensive while in the <u>recovery room</u>.</p>	<p>Usually due to slipping of ligatures, dislodgement of clots, warming up post-op leading to vasodilatation and rising of BP to normal.</p> <p>Rx: IV fluid, replacing blood, wound re-exploration.</p>
Secondary hemorrhage	1 to 2 weeks post-op	<p>Usually due to necrosis of blood vessels related to the previous repair, and precipitated by wound INFECTION.</p>

But in this stem, it asks about the next step. ABC (**C** = Circulation → correct the low BP by IV fluid first).

Key
98

- ♣ Normal ECG does not rule out Acute coronary syndrome (e.g. MI).
- ♣ Troponin level ↑ 3-4 hours after an attack, and remains high for 2 weeks.

♣ If a patient presents with chest pain suspicious of MI (especially if with RFs such as smoking, HTN, DM, Hypercholesterolemia, old age, pain on exertion):

✓ If ST elevation on ECG → MONA then **PCI** -preferred- (or **alteplase**).
(STEMI)

✓ If ECG is normal but Troponin is high → **LMWH** (e.g. **Fondaparinux**) + **Aspirin**
(Non-STEMI)

✓ If both ECG and Troponin levels are normal and haemodynamically stable
→ **Discharge home with “outpatient” Cardiology review.** (✓) **Recent Exam**
(could be stable/ unstable angina = needs cardiology review)

All these three points were asked previously!

Key
99

Cardiac Tamponade

- **Beck's Triad:**

Hypotension ■ **Muffled Heart Sounds** ■ **High JVP** (Distended neck veins).

- **Others:** Dyspnea, Pulsus Paradoxus, Tachycardia.

- **Cardiac Tamponade can develop as a complication of MI:**

After MI → Acute pericarditis → Pericardial effusion → Cardiac Tamponade.

- **Trauma** is the most important cause for cardiac tamponade.

N.B. **Chest X-ray** that shows **enlarged globular heart** →

Either **Pericardial effusion** (OR) **Cardiac Tamponade**.

- Dx: **Echo** is diagnostic
- Tx: **Urgent pericardiocentesis**.

Important!

If the patient is in hypovolemic shock (severely low BP) and the question asks about the **[INITIAL]** treatment line and **IV fluids** is within the option, pick it!

Cardiac Tamponade:

Oxygenation and ventilation → 1 to 2 L IV fluid NS → bedside Pericardiocentesis.

Key
100

Criteria “features” of Life-threatening Asthma:

- Altered mental status with drowsiness.
- Silent Chest (Absent chest sounds)
- Poor respiratory effort.
- Exhaustion.
- Cyanosis.
- Arrhythmia.
- Hypotension.
- PEF < 33% predicted or best.
- SpO2 < 92%.
- PaO2 < 8 kPa.
- PaCO2 is normal (4.6-6 kPa)

Example (1)

A 3yr old boy with asthma presents to the A&E with acute attack of wheeze. He is drowsy and has cold periphery. His HR is 180bpm, he has intercostal recession and widespread wheeze. What is the most significant feature that shows impending respiratory failure?

- A. Cold periphery
 - B. **Drowsiness**
 - C. HR of 180bpm
 - D. Intercostal recession
 - E. Widespread wheeze
-

Example (2)

A 3yr old boy with asthma presents to the A&E with acute attack of wheeze. He is cyanotic and has RR of 45. His HR is 180bpm, he has intercostal recession and widespread wheeze. What is the most significant feature that shows impending respiratory failure?

- A) RR of 45
- B) **Cyanosis**
- C) HR of 180bpm

- D) Intercostal recession
E) Widespread wheeze

Example (3)

A patient recently diagnosed of asthma which has been well controlled, now presents with increase respiratory rate, temp 36.7, auscultation reveals absent breath sound.

Which of the following will indicate life threatening asthma?

- A. Absent breath sound
B. Increased respiratory rate
C. Intercoastal recession

Key
101

Basal Skull Fracture → **Temporal** bone fracture

- Battle sign (**mastoid ecchymosis**).
- **CSF rhinorrhea**.
- Periorbital ecchymosis (raccoon eyes).
- **Hearing loss**.
- Hemotympanum.

	<ul style="list-style-type: none"> • 7th nerve pals^y. <p>Basal skull fracture mostly affects the following bones:</p> <ul style="list-style-type: none"> ✓ <u>Temporal bone</u> (the petrous part of the temporal bone). ✓ The eardrum. ✓ The external auditory canal.
Key 102	<p>Chest pain, Dyspnea, Obesity, Oral contraceptive pills, High D-dimer.</p> <p>Think → Pulmonary embolism.</p>
Key 103	<p>☑ The presence of the red flags of sepsis necessitates the start of Sepsis Six within 1 hour and thus the patient <u>needs to be admitted with in-patient management</u>.</p> <p>☑ Important Red Flags of Sepsis:</p> <p>Systolic B.P ≤ 90 Heart rate > 130 Respiratory rate ≥ 25 Not passed urine in last 18 h/ UO < 0.5 ml/kg/hr</p> <p>☑ Sepsis Six:</p> <p>1) High flow O2.</p>

- 2) IV fluids.
- 3) IV antibiotics “broad-spectrum”.
- 4) Blood cultures.
- 5) Full blood count, U & E, Clotting factors, Lactate.
- 6) Monitor urine output hourly.

Key
104

Diabetic ketoacidosis:

- Occurs mostly in DM type 1

- Presentation:

Abdominal pain, vomiting, Kussmaul breathing (deep hyperventilation),
dehydration, glucose > 11.

- Management:

✓ Initially → IV fluids Normal saline (0.9% NaCl).

✓ followed by IV infusion of insulin + measure arterial blood gases (ABG).

“Sometimes, ABG is not given, instead, VBG is given -venous blood gases-”

N.B. Sometimes, these options are not given,

pick (measure capillary blood glucose) Obviously!

- Dx: (pH < 7.3), ketonemia > 3 or ketonuria ++, Glucose > 11, Bicarb < 15).

■ About the management of diabetic ketoacidosis (DKA):

(Abdominal pain ± Nausea/Vomiting ± Hx of DM-1) → Think DKA.

✓ Start with IV fluid (**normal saline = 0.9% NaCl**). “initial”.

✓ IV insulin pump infusion is added after an hour of the beginning of IV fluid. The rate of infusion is 0.1 unit/kg/hour.

✓ Based on venous blood gas reports, we may need to correct hypokalemia if K^+ is 3.5-5.5 or less by adding 40 mmol/l of potassium chloride (KCL).

“even though 3.5-5.5 is considered normal, we need to start adding KCL. This is because the ongoing insulin will lead to further hypokalemia”

✓ To prevent rapid correction of hyperglycemia which may lead to hypoglycemia, we replace IV NS with D5 or D10 when the plasma glucose is less than 12 (some sources say 14).

✓ Although the DKA patients are in metabolic acidosis, adding sodium bicarbonate is not recommended by many sources as it may increase the risk of cerebral edema.

NOTE:

The initial fluid therapy in a patient with diabetic ketoacidosis is:

→ **500 ml of 0.9% sodium chloride over 15 minutes**. “bolus”.

Followed by a continuous rate “infusion”:

Key
105**Pneumothorax**

Pneumo = Air

- ◆ Acute respiratory distress “Tachypnea, Desaturation”
- ◆ ↑ Jugular venous pressure (Distended neck veins)
- ◆ On percussion over the affected side → Hyperresonance “air”.
- ◆ ↓ BP (Hypotension) “not always marked”
- ◆ ↓ Air entry (absent or diminished breath sounds on the affected side).
- ◆ Trachea/ Mediastinum deviation to the “**OPPOSITE**” side. (commonly in **Tension** pneumothorax). “This feature is not always present”.

✓ [Note that, **distended neck veins** and **shifted trachea** are seen more in “**tension**” pneumothorax than in “simple” pneumothorax].

✓ Note that “tension” pneumothorax may occur after thoracic trauma.

✓ One of the most common causes of tension pneumothorax is **mechanical ventilation** in patients with pleural injury. One should suspect it if a patient on mechanical ventilation suddenly deteriorates and develops low O₂ saturation and hypotension. **Imp ✓**

Management

*Do not wait for Chest X ray if the patient is severely distressed or the clinical diagnosis is certain. Give **High O2** ✓ **initially** and begin with:*

1) → **Needle Decompression.**

(**Insert a large-bore cannula into the 2nd intercostal space in the mid-clavicular line on the “affected side”**)

• Current “new updated” Guidelines → **5th intercostal space, midaxillary line.**

Then “after air has been aspirated and the patient has become less distressed”

2) → **Insert a chest drain in mid-axillary line.**

If the patient is stable with good O2 saturation, the investigation would be
→ **Chest X ray.**

Do not confuse it with **Cardiac Tamponade**:

Cardiac Tamponade → **Beck's Triad** →

Hypotension, Muffled Heart Sounds, High JVP (Distended neck veins).

N.B. Chest X-ray that shows **enlarged globular heart** →

either Pericardial effusion (OR) Cardiac Tamponade.

- Dx: **Echo** is diagnostic
- Tx: **Urgent pericardiocentesis.**

Additional important notes on Pneumothorax

■ Primary Spontaneous Pneumothorax:

- Occurs spontaneously without a previous lung disease.
- Mostly affects **Tall Then Young Males (hints)** with no apparent reason.

☐ “Please, consider **primary spontaneous pneumothorax** in any **tall, thin, male** who presents with increasing dyspnea, chest pain”

☐ Sometimes, acute severe asthma may have an underlying pneumothorax.

☐ For initial Diagnosis → **Erect Chest X-ray** “if the patient is not severely distressed” Otherwise, we proceed immediately to **needle decompression**.

■ Secondary Spontaneous Pneumothorax:

- Occurs spontaneously in the presence of an underlying lung disease

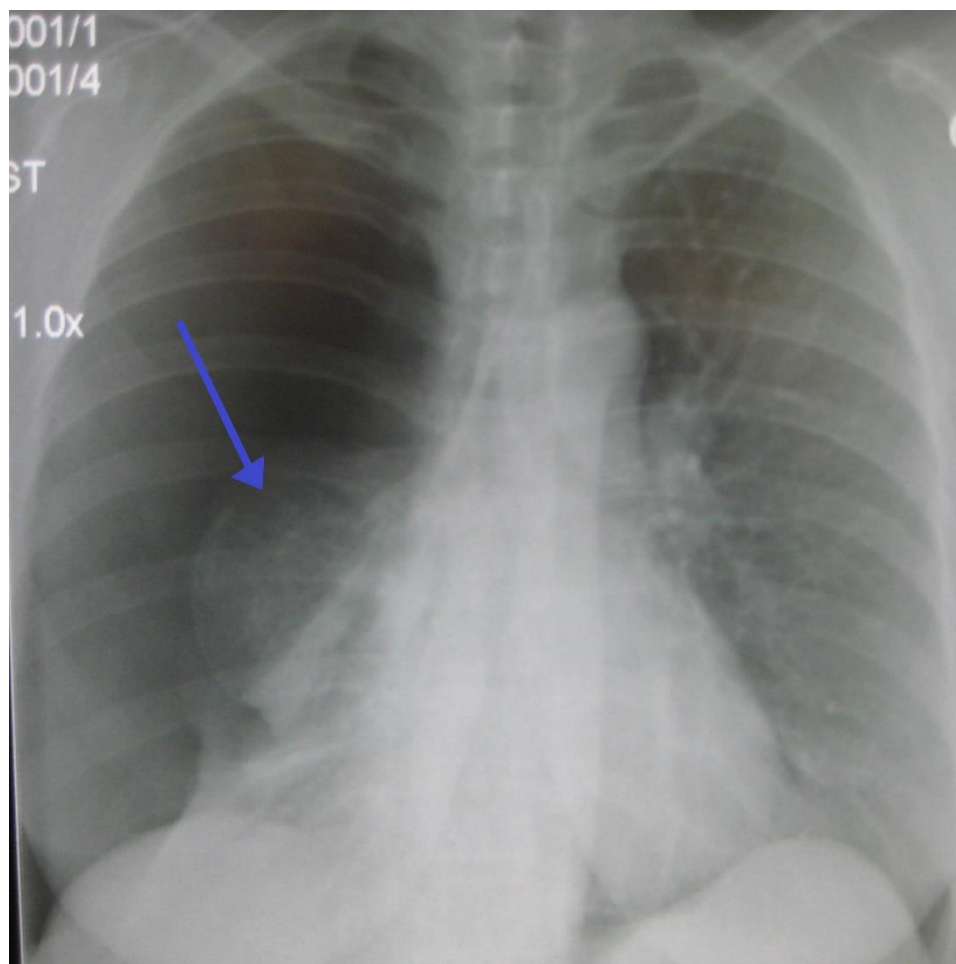
Such as **asthma** or **Chronic Obstructive Pulmonary Disease** (e.g. Hx of Chronic Smoking).

Important,

the initial management in the presence of underlying lung disease e.g. asthma, COPD:

- if the pneumothorax is (< 2 cm air rim i.e. $< 50\%$) → **Aspirate “insert Cannula”**
- if the pneumothorax is large (≥ 2 cm air rim i.e. $\geq 50\%$) → **“Insert Chest Drain”**

Example:



This is an X-ray of a patient who resented with sudden SOB and chest pain. He has an underlying COPD as he is a long-term smoker. Therefore, this is likely a secondary pneumothorax. Note that it is > 2 cm ($> 50\%$). Thus, the treatment is by → **inserting chest drain**.

Sometimes, iatrogenic pneumothorax develops after some procedures e.g., mechanical ventilation, central line replacement, lung biopsy, percutaneous liver biopsy.

Also, if the pneumothorax is large → **insert chest drain**.

■ Traumatic Pneumothorax

Examples, post- car accident, after receiving a stab on the back, post-interventional radiology into chest -e.g. **CT guided biopsy to a mass in chest**), a patient receiving mechanical ventilation who suddenly deteriorates and develops desaturation and hypotension.

→ Usually **tension pneumothorax**

→ **Insert cannula (large bore) to the second intercostal space at the midclavicular line on the affected side (ie. **Needle Decompression**)**.

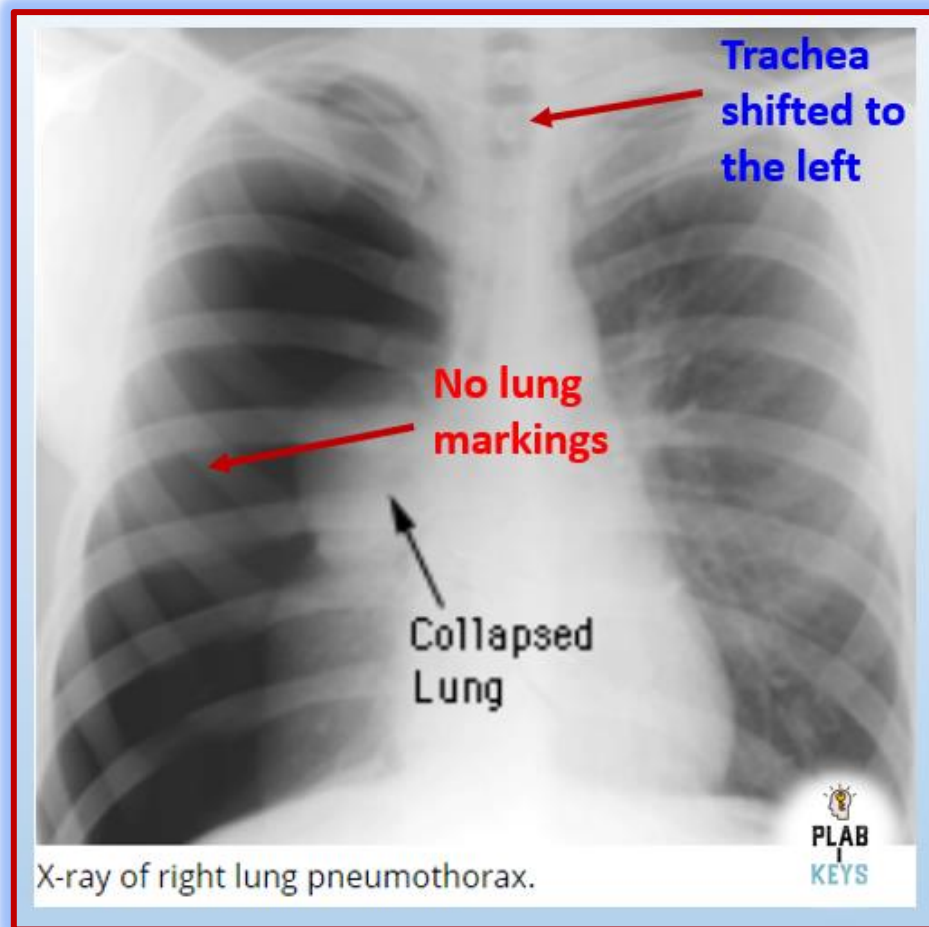
• **ATLS “new updated” Guidelines** suggest the site of insertion as follows:

→ **5th intercostal space, midaxillary line**.

Sometimes, iatrogenic pneumothorax develops after some procedures e.g., mechanical ventilation, central line replacement, lung biopsy, percutaneous liver biopsy.

Also, if the pneumothorax is large → **insert chest drain**.

♣ Sometimes, a stem would give a case of desaturating patient and Hx of smoking or COPD but instead of giving you the other features (such as shifted trachea), it would give you an apparent Chest X-ray:



Important Notes:

✓ Remember, if the stem mentions “muffled heart sounds” along with hypotension and engorged neck veins, think of **Cardiac Tamponade**, and **Pericardiocentesis is needed**. In the absence of muffled -weak- heart sound in a stem, the answer is most likely **not** Cardiac Tamponade.

✓ Otherwise, consider **Pneumothorax** “post-traumatic is usually **tension** type” especially in the presence of “**decreased air entry** over one side -the affected side-, **tachypnea**, **tachycardia**, **hypotension**”. **Note that Trachea is NOT always shifted**. In such a patient, “**urgent needle decompression**” is needed.

✓ Remember, in “**hemothorax**”, there is **no engorged neck veins**”

Please, do not forget that secondary pneumothorax “i.e. on top of asthma or COPD” if large ($\geq 50\%$ or ≥ 2 cm by volume), the most appropriate management would be **chest drain + admission**.

If small 2ry pneumothorax (less than 50% or 2 cm), pick needle aspiration “decompression”.

Key
106

Notes on Hyperkalemia:

Remember that **ACE inhibitors** “eg, **ramipril**” can cause **Hyperkalemia**.

Remember that K^+ sparing diuretics “**spironolactone**” can cause **Hyperkalemia**.

→ Feeling unwell, Racing heart (palpitations), Nausea, \uparrow serum Potassium.

✓ The next step → **12-lead ECG** and put patient on cardiac monitor. This is because hyperkalemia can cause ventricular fibrillation and thus cardiac arrest.

✓ ECG may show → Tall Tented -peaked- T wave, Prolonged QRS.

✓ Once these ECG changes occur → give IV calcium gluconate OR calcium chloride “to protect the heart”.

✓ After that, shift the potassium intracellularly by giving → insulin + dextrose OR nebulized salbutamol.

Important:

What if a patient was started on ACE inhibitors (eg, enalapril) and a few weeks later his serum potassium was found to be moderately elevated (6.0-6.4) but **without** any ECG changes or symptoms of hyperkalemia (eg, muscle weakness, paraesthesia, syncope).

The immediate step → Repeat potassium level.

Also, stop ACE inhibitor until his potassium level becomes within normal levels.

So, firstly, stop drug and repeat potassium level.

Important other causes of hyperkalemia:

- **ACE inhibitors** (e.g. Enalapril, Ramipril).

	<ul style="list-style-type: none"> • ARBs (e.g. Losartan, Valsartan, Candesartan). • Potassium-sparing diuretics (e.g. Spironolactone/ Eplerenone) • CKD. • Addison's (1ry Adrenal Insufficiency). • Congenital Adrenal Hyperplasia (CAH).
Key 107	<p>■ For children, do CT scan of the head within 1 hour of the injury if any of the following:</p> <ul style="list-style-type: none"> ✓ Seizure after the accident. ✓ GCS < 14 (on initial assessment). ✓ GCS < 15 (after 2 hours of the injury). ✓ Any sign of basal skull fracture. ✓ Suspected depressed or open skull fracture or tense fontanelle. ✓ Focal neurological deficit. <p>■ For children, do CT scan of the head within 1 hour of the injury if ≥ TWO of the following risk factors:</p> <ul style="list-style-type: none"> ✓ Loss of consciousness for ≥ 5 minutes. ✓ Amnesia (loss of memory) for ≥ 5 minutes. ✓ ≥ 3 episodes of vomiting. ✓ Fall from a height of > 3 metres.

✓ Road traffic accident of a high speed.

✓ Abnormal drowsiness.

Important Q1)

What if a child presents with only one of these risk factors:

e.g. A boy fell from his bicycle and lost memory for > 5 minutes. He also had lost his consciousness for a few seconds.

→ **Observe for at least 4 hours after the injury.**

Only one risk factor (amnesia > 5 minutes).

Note that losing consciousness for a few seconds does not count as a risk factor. Losing consciousness for > 5 minutes counts.

Important Q2)

e.g. A boy fell from his bicycle and lost memory for > 5 minutes. He also had 3 discrete episodes of vomiting.

→ **CT scan of the head within 1 hour.**

2 risk factors (amnesia > 5 minutes + 3 episodes of vomiting).

Important Q3)

e.g. An 8 YO girl was playing in the garden and found by her father seizing on the floor. He took her to the urgent care centre. Her seizure lasted for 8 minutes. She also had 3 discrete episodes of vomiting.

→ **CT scan of the head within 1 hour**.

Another correct answer (**refer to the emergency department**) to do CT in 1 hr.

- 2 risk factors (seizure with LOC > 5 minutes + 3 episodes of vomiting).
- Remember that the presence of seizure alone necessitates CT in one hour.

Here, we suspect she hit her head while playing alone in the garden.

Key 108 **Beta blocker poisoning (overdose)**

e.g., Propranolol

√ Important Manifestations:

Hypotension, Bradycardia, Dizziness,

√ Management:

Supportive → ABC

◆ For Hypotension → IV fluids, if still severe hypotension (SBP < 90) → Give Glucagon.

◆ For symptomatic Bradycardia → Atropine.

Example 1:

After propranolol overdose, the patient was given IV fluids and his BP started to get within normal range (SBP >90). What is the next step?

→ Give atropine to correct the bradycardia.

Propranolol overdose would lead to bradycardia.

Key
109

What is the most appropriate test to determine the severity of asthma exacerbation?

→ Peak expiratory flow rate (PEFR) using a peak flow meter.

- **Moderate** asthma exacerbation → PEFR **50-75%** best or predicted
- **Acute severe** asthma exacerbation → PEFR **33-50%** best or predicted → Admit the patient if any features of severe asthma remain after initial management.

	<ul style="list-style-type: none"> • Life-threatening asthma → PEFR <33% best or predicted → Admit immediately.
Key 110	<p>A 50 YO man presents to the ER with fever and abdominal pain. He has been having severe vomiting for the past few days. His arterial blood gas shows:</p> <p>pH 7.47 (Normal: 7.35-7.45).</p> <p>PaO₂ 8 (Normal: 10-14).</p> <p>PaCO₂ 9.3 (Normal: 4.7-6).</p> <p>Bicarbonate 29 mmol/L (Normal: 22-26).</p> <p>What is the most likely interpretation of his ABG?</p> <p>✓ pH is high → Alkalosis.</p> <p>✓ Bicarb is high → Metabolic</p> <p>→ Metabolic alkalosis.</p> <p>However, his paCO₂ “the acid” is also high → This means that the lungs are trying to keep more CO₂ “acid” to compensate and puffer the alkalosis in an attempt to reduce the pH.</p> <p>→ respiratory compensation</p>

	<p>Therefore, the answer is</p> <p>→ Respiratory compensated metabolic alkalosis.</p> <ul style="list-style-type: none"> • the better word is -partially compensated- as the pH is still high. • Remember that severe vomiting → loss of potassium ions and gastric acid → metabolic alkalosis.
Key 111	<p>■ Large (>2 cm) 2ry pneumothorax on top of COPD → insert chest drain.</p> <p>■ Large iatrogenic pneumothorax after lung biopsy → insert chest drain.</p>
Key 112	<p>A 60 YO man on ramipril for his hypertension has serum potassium of 6.7 mmol/L (Normal: 3.5-5). His ECG shows sinus rhythm without hyperkalemic changes. What is the next step in management?</p> <p>Although there is no ECG changes of hyperkalemia “tall tented T waves”, this patient has severe hyperkalemia (>6.5) and the initial step is to protect the heart and prevent cardiac arrest by giving a medication that antagonizes the cardiac membrane excitability as a temporary measure such as:</p> <p>calcium Gluconate 10% or calcium chloride or calcium carbonate.</p>

What next?

In severe hyperkalemia:

Insulin with dextrose is given to shift the potassium from blood into cells.

In a recent exam, it was asked about the doses of insulin with dextrose.

☐ If the patient's bedside blood glucose is normal:

→ IV Actrapid insulin 10 units with 50 ml of 50% dextrose over 10-15 minutes.

☐ If the patient's bedside blood glucose is high (> 11.1):

→ IV Actrapid insulin 10 units with 50 ml of 0.9% sodium chloride over 10-15 minutes.

Note that Actrapid is soluble short acting insulin that is used in hyperkalemia.

Careful for the numbers here!

Key 113 Gastroenteritis → Vomiting, Diarrhea, Fever → Hyponatremia

	<p>→ Give IV normal saline (0.9% sodium chloride).</p>
Key 114	<p>Foreign body is inhaled into the respiratory system</p> <p>→ cough, SOB, wheezes “stable patient”</p> <p>→ chest x-ray ± bronchoscopy</p> <p>√ Sometimes, chest X-ray would not be given in the options, pick bronchoscopy, or rigid bronchoscopy.</p> <p>√ Also, Chest x-ray maybe normal as some substances are radiolucent “not detected by X-ray”. Therefore, bronchoscopy is needed for inhaled FB.</p>
Key 115	<p>A 35 YO man was playing football and felt dull central chest pain that is not radiating anywhere. It lasted for 20 minutes. After 8 hours, he presents to the ER to investigate. ECG is normal. Troponin is normal “below 12”. CK is mildly elevated. His father died from a sudden cardiac event at age of 33. What should be done?</p> <p>It is unlikely a case of ACS (STEMI, NSTEMI, Unstable angina):</p> <p>√ This is not STEMI “ECG is normal without ST elevations”.</p> <p>√ This is not NSTEMI “troponin is normal although enough time had passed i.e., 8 hours”.</p>

	<p>✓ It is unlikely unstable angina “in unstable angina, pain presents even at rest, T waves inversion might be seen on ECG”</p> <p>It might be stable angina</p> <p>And because of the Hx of sudden cardiac death in his father, a cardiology team review is needed:</p> <p>→ Discharge with outpatient cardiology review.</p>
Key 116	<p>A young man was found unconscious on the floor with MDMA (Ecstasy) pills in his pocket. Now in the ER, he is agitated, sweaty, and has HR of 110 and RR of 22. His limbs are rigid and his pupils are dilated. His temperature is 40.5. He is mechanically ventilated. What medication is useful in this case?</p> <p>This is a case of MDMA (ecstasy) toxicity.</p> <p>→ Dantrolene can be used to manage drug-induced <u>hyperthermia</u>.</p> <p>Ecstasy (MDMA) Overdose:</p> <ul style="list-style-type: none"> • Agitation, confusion, anxiety, ataxia. • Tachycardia, hypertension • Tachypnea.

- Thirst.
- Metabolic acidosis (e.g., ↑ venous lactic acid).
- Hyperthermia (↑ body temperature)
- Spots of colours (flashing/ flouing colours).
- Uncontrolled body movements, muscle rigidity, trismus.

Management

- **Supportive**: ABC + treat metabolic acidosis.
- **IV diazepam** or **lorazepam**: for agitation.
- **Dantrolene** may be used for hyperthermia if simple measures fail.

Key 117 A 30 YO man was brought by his friend to the A&E department. He is drunk and has been drinking plenty of alcohol over the past 24 hours. He is well known to the hospital because of his frequent visits due to alcohol. He is in tears and asks for help and support but does not want to be admitted.

→ **Refer to alcohol abuse services.**

Key 118 A 30 YO man is brought to the A&E after road traffic accident. He has pain over the left 6th and 7th ribs with decreased breath sounds on the left. He feels breathless. On percussion, there is dullness over the left chest.

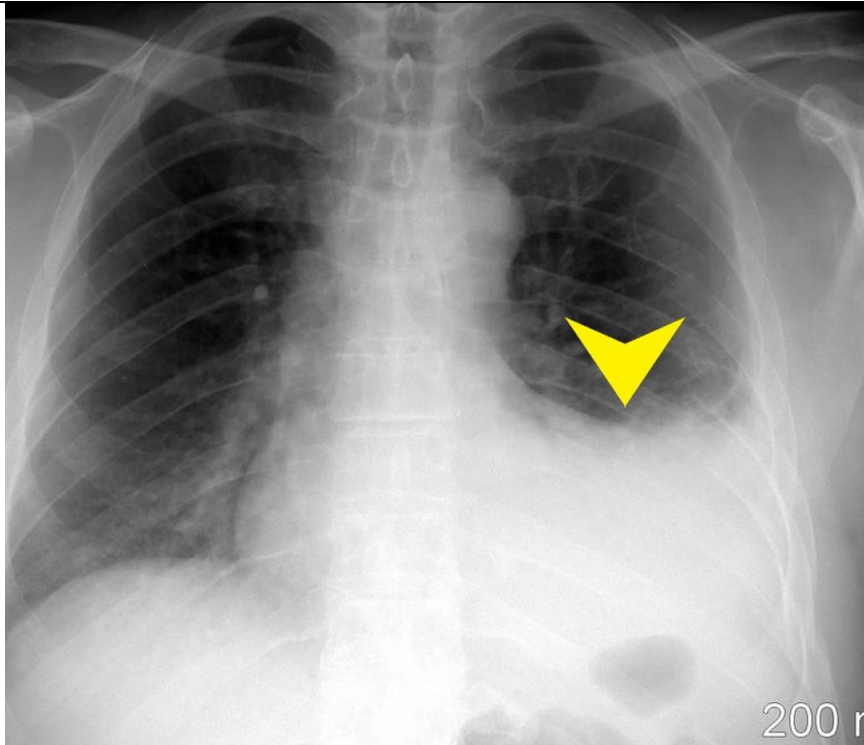
What is the most likely Dx?

→ **Hemothorax**. (blood accumulation in pleural cavity).

- In **flail chest**, no dullness on percussion and there would be abnormal chest motion (Paradoxical Respiration; on inspiration, one side pulls inwards while the other side pulls outwards).
- **Tension or traumatic pneumothorax** may be similar but again, dullness on percussion is seen in hemothorax, while in pneumothorax, it would be hyperresonance.

■ Chest X-ray of Hemothorax

→ Blunting of the hemidiaphragm resembling that of pleural effusion.



▣ Management of Hemothorax:

- ✓ O₂.
- ✓ Insert 2 large venous canulae and send blood for cross matching.
- ✓ Chest Drain Insertion → To evacuate blood and prevent empyema.
- ✓ Surgery to stop bleeding is RARELY needed as the lung is a low pressure system and thus bleeding usually stops on it own.

Key 119 A 30 YO woman who is a beekeeper always gets stung by the bees and develops rashes. She also has some food allergies. What should be done?

→ Always carry ORAL antihistamine with her.

- This is urticaria – allergic reaction. She needs **Oral Antihistamine**.
- This should not be mistaken by anaphylaxis which would show lips and mouth swelling followed by breathing problem “which requires **adrenaline**”.
- This woman should be advised to **always carry oral antihistamine with her**.

Eruption of **itchy rash** after **URTI**, or after **stress** (e.g., playing football) ie, exercise-induced urticaria, or after taking **aspirin or opiates**, **certain foods**, or soon after **insect bite** → Think **urticaria (an allergic reaction, not anaphylaxis)**
 Give → **Oral Antihistamine**
 (eg, **Cetirizine**, **Loratadine**, or less favored **Chlorpheniramine** as it is sedating).
 The rash is described as **wheals**.

This is an **allergic reaction** (severely itchy rash). We do not give **IM adrenaline** unless **anaphylactic shock** is suspected by any of the following:

Shortness of breath ■ **Stridor** ■ **Hoarseness of voice** ■ **Wheezes** ■ **Shock** ■
Swelling of tongue, face, cheek

✓ If any of these develops → IM adrenaline (epinephrine).

✓ If only itchy rash → oral antihistamine.

Key 120 A 66 YO man presents to the ER with sharp severe substernal pain that started suddenly 3 hrs ago. His ECG shows ST elevation. He has a Hx of hypertension. His BP on the right side is significantly higher than that on the left side. His Troponin and D-Dimer are elevated. What is the most likely Dx?

→ **Thoracic aortic dissection**.

	<ul style="list-style-type: none"> • The pain of MI increases in intensity with time and it is crushing or dull. The pain of aortic dissection is Sudden (abrupt) and sharp/ tearing. • HTN is a risk factor for both conditions. However, it is a more prominent risk factor for aortic dissection. • Elevated D-dimer and troponin can be seen in both conditions. • Unequal BP in both arms is a feature of aortic dissection and not MI. • Thus, the features are more towards thoracic aortic dissection.
Key 121	<ul style="list-style-type: none"> • Full thickness circumferential <u>burns</u> affecting a limb can cause compartment syndrome (severe pain + absent or reduced pulse + paraesthesia) → <u>Urgent Escharotomy</u> is needed to relieve the pressure. • <u>Crushing injury</u> causing compartment syndrome (e.g., a heavy concrete fell on a limb for a long time that has led to loss of circulation and a resultant compartment syndrome) → <u>Urgent Fasciotomy</u> is needed to relieve the pressure and restore the circulation. <p>So:</p> <p>✓ Full thickness circumferential burns that led to compartment syndrome</p>

	<p>→ Urgent escharotomy.</p> <p>✓ Crushing injury that has led to compartment syndrome</p> <p>→ Urgent fasciotomy.</p>
Key 122	<p>A 24-year-old woman who is a known case of diabetes mellitus type 1 is brought to the A&E department by her friends. She is sweating profusely and trembling. She has been vomiting and not been able to tolerate orally over the last 14 hours. The patient appears lethargic and confused. Her pulse is 100 beats per minute, respiratory rate is 21 breaths per minute and capillary blood glucose is 1.2 mmol/L. She has no intravenous line currently. What is the most appropriate management?</p> <p>A) Intravenous glucose 20%. B) Glucose gel 40% (2 tubes). C) Intramuscular glucagon 1 mg. D) 200 ml orange juice. E) Intravenous glucose 10%</p> <ul style="list-style-type: none"> • The patient is scenario has features of hypoglycemia (sweating, shaking (trembling), tachycardia, confusion) + her blood glucose level is < 4 mmol/L. • She is Confused and is unable to swallow (vomiting and not tolerating orally) Therefore → IM glucagon or IV glucose. • Since she does not have IV access currently and is confused → IM glucagon. • Remember that glucagon 1 mg can also be given subcutaneously.

- Remember that if the reason of the hypoglycemia was **alcohol**, we would insert IV line and give IV glucose. (Glucagon is ineffective with alcoholic hypoglycemia).

- What if she was confused but able to swallow?

→ **Glucose gel**. (It can be squeezed between the patient's teeth and gums).

Hypoglycemia

→ [Blood glucose < 4 mmol/L] + tachycardia, sweating, confusion, shaking... etc.

Management of Hypoglycemia (**Important**):

Can swallow = can tolerate orally, not vomiting.

- If **Conscious** and **Can swallow** (can tolerate orally)

→ give **200 ml fruit juice** Or **Oral glucose gel**.

- If **Unconscious** OR **Conscious but Cannot swallow**

→ **IV Glucose** (In case of IV access is already put).

OR **IM or SC glucagon 1 mg (2 tubes)** (In case of IV line is **not** available or **not** put yet or difficult to put as in patients who are having **seizure/ convulsions**).

Key
123

Q) What is the maximum dose of paracetamol per day for adults?

Remember that each paracetamol tablet contains 500 mg.

The maximum daily dose of paracetamol is:

→ 4 gram/day = 8 tablets per day = 2 tablets every 6 hours.

If someone is taking 2 tablets (ie, 1 gram) every 6 hours, the total daily dose (in 24 hours) will be 8 tablets (ie, 4 gram).

Example

A 70-year-old man has been taking paracetamol to control his back pain. He has been taking 12 tablets (ie, 6 grams) of paracetamol every day for the last 5 days. His liver enzymes are elevated. The last taken dose was 15 hours ago. His paracetamol serum level is 15 mg/L. What is the most appropriate action?

→ Start acetylcysteine intravenously.

- This is **staggered overdose** (which requires acetylcysteine infusion).
- Also, the **paracetamol serum level is high**. Read the following:

✓ All patients with plasma paracetamol level ≥ 100 mg/L at **4 hours** after ingestion should receive acetylcysteine regardless of risk factors.

✓ All patients with plasma paracetamol level ≥ 15 mg/L at **15 hours** after ingestion should receive acetylcysteine regardless of risk factors.

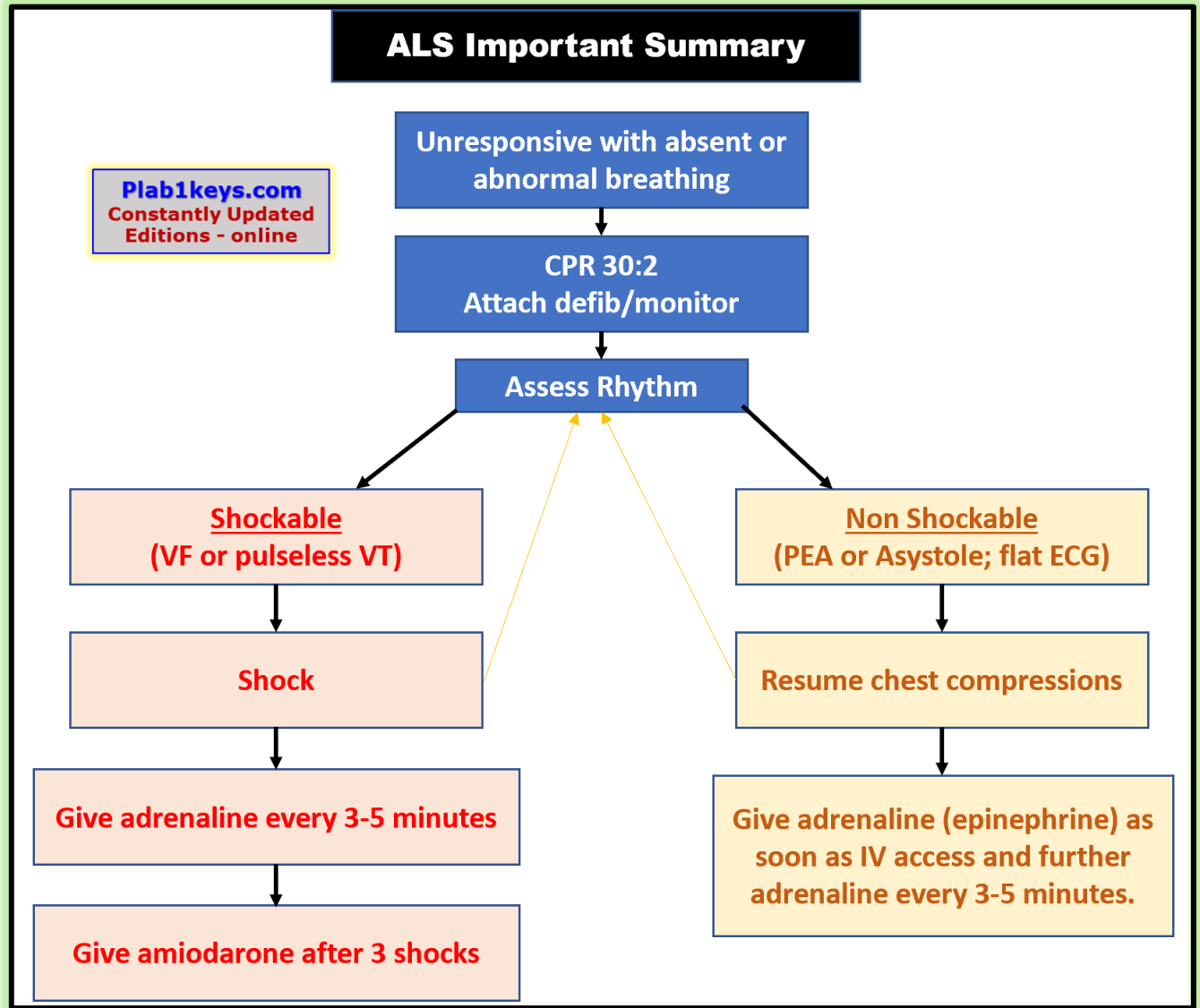
✓ Where there is doubt over the timing of paracetamol ingestion including when ingestion has occurred over a period of one hour or more – ‘staggered overdose’ – acetylcysteine should be given without delay.

✓ administer the initial dose of acetylcysteine as an infusion over 60 minutes to minimise the risk of common dose-related adverse reactions.

✓ hypersensitivity is no longer a contraindication to treatment with acetylcysteine.

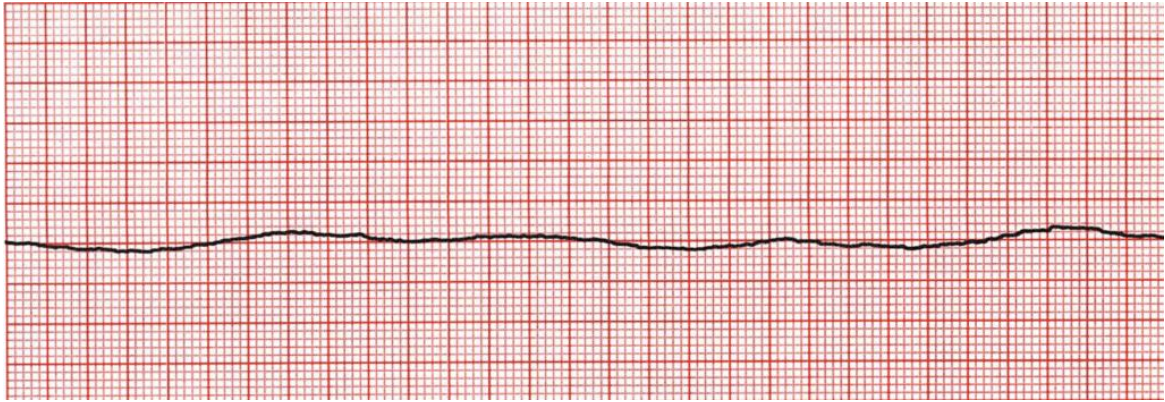
Key
124

ALS important points



▣ **Example (1):**

A 50-year-old man was found unconscious with a absent pulse and undetectable blood pressure. His ECG reading is flat. What is the best management?



→ **Start CPR (Chest Compressions).**

Important: If CPR is not among the options, what's to pick?

→ **Give adrenaline (Epinephrine) 1 mg IV.**

(A flat ECG reading means asystole which is a **non-shockable** rhythm).

- Flat ECG reading + pulseless → Asystole.
- Asystole is a non-shockable rhythm (ie, do not deliver shock).
- In Asystole and PEA (pulseless electrical activity):

CPR → adrenaline (epinephrine) 1 mg IV → resume CPR → Recheck pulse every 2 minutes → resume CPR and give adrenaline every 3-5 minutes (every alternate rhythm check).

■ **Example (2):**

A 50-year-old man was found unconscious with a absent pulse and undetectable blood pressure. His ECG reading shows VT. What is the best management?

→ **Deliver a shock.**

(VT in a pulseless patient and VF requires immediate shock delivery).

Key
125

Quick Reminder:

The first line (initial step) of Rx in DKA

→ **Administer 0.9% sodium chloride (normal saline).**

Key
126

The Primary Survey (ABCDE):

- **A** → **Airway** (Checked here and airway is **patent**).
- **B** → **Breathing** (Checked here and he is **breathing normally**).
- **C** → **Circulation** (Checked here and he has a **pulse**; no CPR needed).
- **D** → **Disability** (Assessment neurological status: he is **unconscious**, a rapid finger-prick bedside test can be done here to exclude hypoglycemic coma).
- **E** → **Exposure/ Environmental** control.

Example (1):

A 24-year-old female was found unconscious by her roommate. The paramedics has found an empty bottle of vodka next to her. She is unresponsive but breathing normally. Her airways are patent and she has vesicular breath sounds. Her heart rate is 96 bpm. What is the NEXT step in the management?

→ **Check capillary blood glucose.**

So, the primary survey (ABCDE)

→ (ABC) are checked here, remaining (D) includes excluding hypoglycemia.

Also, remember the following point:

In contrast to chronic alcohol consumption in the fed state—which raises blood sugar levels, resulting in hyperglycemia—alcohol consumption in the fasting state can induce a profound reduction in blood glucose levels (i.e., hypoglycemia).

Q) For the female in example 2, if she is found to have hypoglycemia, what is the management of hypoglycemia in an unconscious patient?

→ **Administer 75 ml of 20% glucose intravenously.**

Example (2):

A 9-year-old boy is brought unconscious to the ER by his parents. He was playing and then she fell on the ground and became unconscious 20 minutes ago and is still unconscious until now. He has no head injury; his airway is patent and he has vesicular breath sounds and is breathing normally. His heart rate is 120 bpm. There are no visible wounds. What is the NEXT most appropriate management?

→ **Check capillary blood glucose.**

Example (3):

A 66-year-old man fell down on his head and is brought to the ER. He is confused with a GCS of 13. He is on warfarin for atrial fibrillation. His oxygen saturation is 83%. What is the NEXT step in the management?

→ **Administer oxygen.**

ABCDE: A and B; his oxygen saturation is low, give oxygen.
After that, confirm if he has brain injury or not (CT scan head).

Key
127

Important Points on Hyperkalemia Management:

If a patient was started on **ACE inhibitors** (eg, **enalapril**) and a few weeks later his serum potassium was found to be moderately elevated (6.0-6.4 mmol/L) but **without** any ECG changes or symptoms of hyperkalemia (eg, muscle weakness, paraesthesia, syncope).

- The immediate step → **Repeat potassium level.**
- Also, **stop ACE inhibitor until his potassium level becomes within normal levels.**
- So, firstly, stop the causing drug and repeat potassium level.
- If ECG was not done yet, then do ECG first.

Notes:

- Calcium resonium has no role in managing acute hyperkalemia as it lowers serum potassium level very slowly.

- Remember, if ECG shows tall tented T waves or there are symptoms of hyperkalemia:

→ Give IV calcium gluconate OR calcium chloride “to protect the heart”.

- After that, shift the potassium intracellularly by giving

→ Give insulin + dextrose OR nebulized salbutamol.

▣ Important Causes of Hyperkalemia:

- **ACE inhibitors** (e.g., Enalapril, Ramipril). • **ARBs** (e.g., Losartan, Valsartan).
- **Potassium-sparing diuretics** (e.g., Spironolactone/ Eplerenone)
- **Acute or chronic kidney disease.** • **Crush injury.**
- **Addison’s** (1ry Adrenal Insufficiency). • **Congenital Adrenal Hyperplasia** (CAH).

▣ Steps of Hyperkalemia Management:

- 1) Stop the causing medication (eg, ACE inhibitor, ARBs, Spironolactone).
- 2) Do ECG (to look for ECG changes for hyperkalemia; tall tented T waves).
- 3) If mild or moderate hyperkalemia (up to 6.4 mmol/L) + **WITHOUT** ECG changes or symptoms (eg, muscle weakness, cramps, paraesthesia, syncope):

→ Repeat serum potassium level after stopping the causing drug.

4) If there are ECG changes and/or hyperkalemia symptoms:

- Give IV calcium gluconate **OR** calcium chloride “to protect the heart”.
 - After that, shift the potassium intracellularly by giving
- Give insulin + dextrose **OR** nebulized salbutamol.

Key
128

In cases of simple allergic reaction (eg, only rash with severe itching), and there is no difficulty in breathing, shortness of breath, wheezes, or edema of oral cavity.

Examples: after eating something, after stress, after a match game, after a bee sting, after a medicine intake.

Since there are only itchy rash

→ This is an **allergic reaction** (not anaphylaxis).

→ Do **not** pick IM epinephrine (unless SOB, difficulty breathing, wheezes...etc).

What if it is a simple allergic reaction -only itch rash- but you have to choose between (Oral antihistamine eg, **oral chlorpheniramine) and**

(IV hydrocortisone)?

→ Pick **oral chlorpheniramine (oral antihistamine)**.

Antihistamine first (either oral or IV), then (IV hydrocortisone) if needed.

Key
129

Lithium "IMPORTANT"

☐ Lithium is **mood stabilising** drug used most commonly in **bipolar disorder** but also as an adjunct in refractory depression.

☐ Features of Lithium toxicity (**Important**)

✓ **Coarse tremor** (a fine tremor is seen in therapeutic levels)

✓ **Muscular twitching, weakness**

✓ **Nausea** and **Vomiting**

✓ **Drowsiness, confusion**

✓ **Hyperreflexia**

✓ **Seizure** (in severe toxicity)

✓ **Coma** (in severe toxicity)

✓ **Blurred vision**

✓ **Tinnitus** (ringing ear).

☐ Management (**imp**).

◆ Stop lithium and take serum lithium levels.

If high → **Amit the patient to the medical ward** (& repeat levels each 6-12 hours).

◆ Mild-moderate toxicity may respond to resuscitation with normal saline.

◆ Haemodialysis may be needed in severe toxicity.

■ If **lithium toxicity** developed (eg, blurry vision, tinnitus = ringing ears, dizziness, lethargy, muscle weakness, diarrhea, vomiting)

→ **Stop lithium, take serum lithium level → admit to medical ward, and repeat serum lithium level every 6-12 hours** + Supportive care (There is **no antidote** to lithium toxicity).

When toxicity resolves, lithium can be restarted at a lower dose (Never stop lithium suddenly; it has to be gradually over a period of 3 months to prevent relapse).

Example 1,

A 41-year-old presents to the ER with nausea, vomiting, muscle weakness, coarse tremors, blurred vision, dizziness and tinnitus. He is on lithium for his bipolar disorder and has recently increased the dose. His lithium level is found to be high. The last time he took his lithium tablet was 13 hours ago. His ECG is normal. His blood pressure is 130/80 mmHg. The doctor asked him to stop his lithium temporarily. What is the most appropriate action?

→ **Amit him to the medical ward.**

(For observation + for measurement of serum lithium levels **every 6-12 hours**).

Example 2,

A man with **bipolar disorder** for 10 years and knee pain for which he takes **ibuprofen** develops **tremors**, **vomiting** and **confusion** while travelling a long distance.

The most appropriate test to be done → **Serum Lithium concentration**.

Note, **Diuretics** and **NSAIDs** (e.g., Ibuprofen) increases renal reabsorption of lithium and hence, the **serum lithium increases** and may lead to toxicity.

Key
130

Hypercalcemia:

- The **first step** in the management of elevated serum calcium (eg, in bone metastasis, in 1ry hyperparathyroidism, TB, Sarcoidosis)

→ **IV fluids (= IV sodium chloride)**. ✓

- The 2nd line → **Bisphosphonate** (eg, **Alendronate**, **Risedronate**, **Pamidronate**).

☐ Remember that **hypercalcemia** manifestations include:

Confusion, **polyurea**, **polydipsia**, **low moods**, **bone pain**, **constipation**, **stones**.

Key 131	<div data-bbox="316 296 1399 432" data-label="Section-Header"> <h3>Investigation of Choice in Abdominal Trauma (Eg, Road Traffic Accident involving the abdomen):</h3> </div> <div data-bbox="134 537 1453 751" data-label="List-Group"> <ul style="list-style-type: none"> • If the patient is haemodynamically stable → CT scan of abdomen. • If unstable (eg, SBP < 90 ■ ↑ capillary refilling time) → U/S Abdomen. </div> <div data-bbox="134 856 1567 1125" data-label="Text"> <p><i>FAST (Focused Assessment with Sonography for Trauma) is done in RTA if the patient is haemodynamically unstable. This is to save time for possible surgical management. On the other hand, CT abdomen is more specific and sensitive but it is more suitable if the patient is haemodynamically stable as it takes more time.</i></p> </div>
Key 132	<div data-bbox="134 1241 1352 1297" data-label="Section-Header"> <h3>TCA (Tricyclic Antidepressant) Toxicity (eg, Amitriptyline)</h3> </div> <div data-bbox="134 1335 1166 1386" data-label="Text"> <p>TCA overdose → Excessive sedation, Dry mouth and skin</p> </div> <div data-bbox="134 1423 1300 1476" data-label="Text"> <p>Sympathomimetic effect: Tachycardia, Sweating, Dilated Pupils.</p> </div> <div data-bbox="134 1514 1526 1566" data-label="Text"> <p>ECG: Sinus tachycardia (Common), Prolonged -wide- QRS complexes, QT, PR</p> </div> <div data-bbox="134 1604 1453 1665" data-label="Text"> <p>Usually, the patient is in metabolic Acidosis (ie, pH < 7.35 ■ $\text{HCO}_3^- < 22$)</p> </div> <div data-bbox="134 1686 922 1747" data-label="Text"> <p>→ Give IV fluid 250 ml Bolus (0.9% NaCl) +</p> </div> <div data-bbox="134 1764 1271 1822" data-label="Text"> <p>IV injection of Sodium Bicarbonate 50-100 ml of 8.4% slowly</p> </div> <div data-bbox="134 1839 1105 1890" data-label="Text"> <p>(50 mmol Sodium bicarb is given by slow IV injection)</p> </div>

N.B. aim for pH of 7.5-7.55!

Sodium bicarb will correct ECG changes and cardiac rhythm.

Important Note: In TCA toxicity- eg, amitriptyline overdose: There could be hyperkalemia resulting from the metabolic acidosis → Give IV fluids and IV sodium bicarbonate to treat the metabolic acidosis and therefore the hyperkalemia would resolve. So, pick IV sodium bicarbonate Instead of calcium gluconate.

Key
133

Management of Symptomatic Bradycardia

☐ The **first drug of choice** for **Symptomatic Bradycardia**

(Dizziness, feeling unwell) is → **Atropine** ✓

(Given 0.5 mg IV push and may be repeated up to a total dose of 3 mg).

What if the patient was given atropine but no response?

Next step would be → Temporary transcutaneous -external- pacemaker.

☐ 2nd Line → Dopamine.

☐ 3rd Line → Epinephrine.

Scenario:

A man presented to the ER feeling unwell and suddenly he collapsed. While in the resuscitation room, his blood pressure was found to be 88/61 mmHg, and his pulse rate was 34 beats/minute. ECG showed sinus bradycardia. What is the most appropriate initial management?

- A) Atropine.
- B) IV fluids.
- C) External pacing.
- D) Amiodarone.
- E) Adenosine.

The answer is → (A) Atropine.

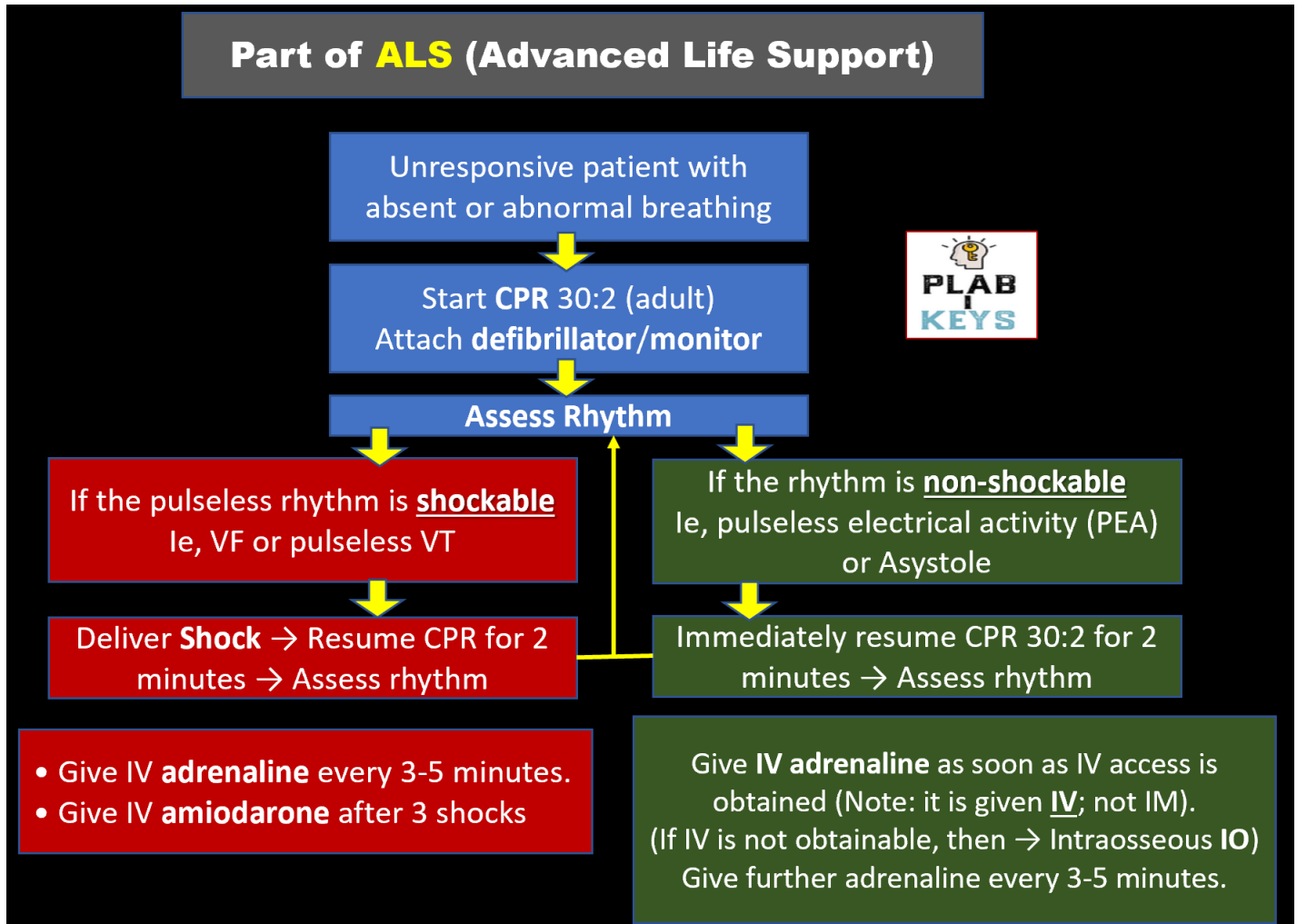
✓ The first line to treat symptomatic bradycardia is **atropine** (given as IV boluses 0.5 mg atropine repeated if needed to max of 3 mg).

✓ Although **IV fluids** are important here as they can raise the cardiac output - temporarily; however, **the cause of shock here is bradycardia** -which needs atropine- rather than hypovolemia. Thus, atropine is more appropriate.

✓ **External pacing** is used in symptomatic bradycardia when atropine fails.

✓ Both **amiodarone** and **adenosine** are used for management of tachycardia.

Key
134 **ACLS: Advanced Life Support.**



Important:

In a recent exam, it was asked about the **route** of administration of adrenaline in an unresponsive patient with asystole who has been given CPR. The answer was → **Intravenously (IV)**.

Note: If IV access is not obtainable, then → **Intraosseous (IO)**.

Key
135**Points on the Management of COPD Exacerbation “imp”**

- **24% - 28% Oxygen** (not 100%) using “venturi face mask”.
 - Maintain O₂ saturation between 88-92%.
 - Nebulised **salbutamol** (with **ipratropium bromide**).
 - Corticosteroids: 100 mg IV **hydrocortisone** or 30 mg prednisolone stat. (prednisolone should be continued as 30 mg OD for 7-14 days).
 - Still no response? → IV **aminophylline**.
 - If purulent sputum, fever, high CRP → give Antibiotics.
 - After giving all these medical options, if he is still dyspnoeic, with impaired blood gas showing respiratory acidosis (low Ph, high PaCO₂):
→ **Non-Invasive Ventilation** (NIV).
- NICE recommends **non-invasive ventilation** (NIV) in patients with COPD exacerbation especially if Ph is 7.25-7.35 (respiratory acidosis).
- If NIV failed or there is impaired mental status, respiratory arrest, high aspiration risk → **Intubate and ventilate** (invasive ventilation).
 - One alternative valid answer is → **Shift patient to ICU (intensive care unit)**.
 - One important indication for intubation: **GCS ≤ 8**.

Example:

A 55-year-old man with a history of COPD presents to the ER with wide chest wheezes and breathlessness. He is afebrile. His pulse rate is 114 bpm, BP is 128/82 mmHg, respiratory rate is 28 breaths/minute and O2 saturation is 85%. He is started on 24% oxygen by Venturi face mask. What is the most appropriate NEXT step in the management?

→ **Salbutamol nebulizers.**

Management of Acute Asthma Exacerbation in Pediatrics

1 ♦ **Oxygen.**

2 ♦ **Salbutamol** Nebuliser (could be given back-to-back).

3 ♦ Add **Ipratropium Bromide** Nebuliser.

“Salbutamol and Ipratropium can be mixed in a solution and repeated”

4 ♦ **Corticosteroids.**

✓ Oral prednisolone (either liquid or crushed tablets dissolved in water)

✓ OR IV hydrocortisone.

5 ♦ If still in asthma exacerbation, consider: *“important”*.

♠ **IV Magnesium sulphate (MgSO₄)**: *tried first before the following 2 options.*

♠ **IV Salbutamol**

♠ **IV Aminophylline** (unlikely to be the correct answer as it is given by seniors in severe life-threatening asthma exacerbations that have failed to respond to the max doses of bronchodilators and steroids)

☐ **Once there is a silent chest** → **Intubate**.

Salbutamol is a short-acting beta₂ agonist (SABA).

Ipratropium bromide is anticholinergic.

After giving O₂, Salbutamol...etc, if the child develops tachypnea, SOP, drowsiness.

Request → **Arterial blood gas**.

(To look for respiratory acidosis and manage accordingly).

Management of Acute Asthma Exacerbation in **Adults**

1 ♦ **O₂**

2 ♦ **Salbutamol** 5 mg (or terbutaline nebulised with O₂)

3 ♦ **Corticosteroids**

✓ **100 mg IV hydrocortisone**. (✓) if not available, give:

✓ **Oral prednisolone** (40-50 mg PO) (✓)

If Severe/ Life-threatening/ Non-improving:

- 4 ♦ Give **Salbutamol nebulizers** back-to-back every 15 minutes and **Add Ipratropium Bromide** 0.5 mg to the Nebulisers.
- 5 ♦ **Single dose of Magnesium Sulphate (MgSO₄)** 1.2-2 g IV over 20 minutes.

If the patient is improving, give **salbutamol** nebulizer every 4 hours and **prednisolone** 40-50 mg PO OD for 5 days.

☐ If **no response**, and or **impending respiratory failure**

→ **Admit to intensive care unit (ICU), for possible mechanical ventilation.**

☐ If **Silent chest** → **Intubate**. ✓

Key
136

Important notes on illicit substances:

- Muscle rigidity + hyperthermia → **Ecstasy**.
- Muscle rigidity + hyperthermia + hypertension + Tachycardia → **Cocaine**.
- Muscle rigidity + hyperthermia + hypertension + Tachycardia + Hallucination → **LSD**.

Example:

	<p>A 33-year-old man ingested multiple illicit substances at a party and became unconscious. In the ER, he has the following observations:</p> <p>Temperature: 39.6 degrees.</p> <p>Heart rate: 132 beats per minute.</p> <p>Blood pressure: 172/101 mmHg.</p> <p>Respiratory rate: 21 breaths per minute.</p> <p>He is diaphoretic (sweating) and has generalized muscle rigidity. He developed a seizure while in the ER. What is the most likely used drug?</p> <ul style="list-style-type: none"> • Muscle rigidity + hyperthermia + hypertension + Tachycardia → Cocaine.
Key 137	<p>Salicylate (Aspirin) Poisoning:</p> <ul style="list-style-type: none"> • Tinnitus, Nausea, Hyperventilation, Confusion. • Respiratory Alkalosis (Early) then Metabolic Acidosis (Later). <p><i>As salicylate poisoning causes respiratory alkalosis, the pH will be elevated (>7.45) and PaCO₂ will be low (because of hyperventilation).</i></p>
Key 138	<p>Amphetamines Overdose</p> <ul style="list-style-type: none"> • Unconsciousness (if severe). • Sympathomimetic effect:

	<p>↑ heart rate, dilated pupil, agitation, ECG: normal “sinus tachycardia”.</p> <p>Remember that in amitriptyline (TCA) overdose, the ECG would show arrhythmia ± wide QRS.</p> <hr/> <p>Important values to remember:</p> <p>✓ Unconsciousness in alcohol overdose: <u>ethanol</u> level should be at least 65 mmol/L or more.</p> <p>✓ Unconsciousness in aspirin overdose: <u>salicylate</u> level should be at least 70 mmol/L or more.</p>
Key 139	<p>In <u>Sickle Cell Crisis</u>:</p> <p>To manage pain, give → IV Morphine.</p>
Key 140	<p>In <u>Pelvic Fracture</u> patient who is haemodynamically <u>unstable</u> (↓ BP):</p> <p>The immediate priority is to stabilise the patient by giving:</p> <ul style="list-style-type: none"> • IV fluids. • Blood transfusion → Request <u>cross-match for packed red blood cells</u> PRBCs (not for whole blood).

Key
141

Toxic Shock Syndrome

■ **Definition:** Toxic Shock Syndrome (TSS) is a rare, life-threatening condition caused by toxins produced by certain strains of bacteria, most commonly *Staphylococcus aureus* and *Streptococcus pyogenes*. These toxins act as superantigens, triggering an overwhelming immune response.

■ Etiology:

- **Staphylococcus aureus:** Associated with **tampon** use, **nasal packing**, and **surgical wounds**.
- **Streptococcus pyogenes:** Often linked to **skin infections**, **surgical wounds**, and **childbirth**.

■ Risk Factors:

- Use of high-absorbency tampons or prolonged tampon use.
- Recent surgery or open wounds.
- Use of nasal packing or wound dressings.
- Immunocompromised state.

■ Clinical Presentation:

- **Initial Symptoms:** **Sudden** high fever, chills, vomiting, diarrhea, and severe muscle aches.
- **Rash:** Diffuse, sunburn-like erythematous rash that can desquamate, especially on the palms and soles.

- **Systemic Involvement:** Hypotension, multi-organ dysfunction (renal failure, liver impairment, respiratory distress), and confusion or altered mental status.
- **Laboratory Findings:** Leukocytosis, elevated liver enzymes, elevated creatinine, and signs of disseminated intravascular coagulation (DIC).

■ **Diagnosis:**

- Clinical diagnosis based on signs, symptoms, and risk factors.
- Blood cultures and other cultures (e.g., wound, vaginal) to identify the causative organism.
- Laboratory tests to assess organ function (e.g., kidney, liver) and full blood count.

■ **Management:**

1. **Immediate Medical Attention:** TSS is a medical emergency requiring urgent admission treatment.
2. **Antibiotics:**
 - Empiric antibiotic therapy typically includes clindamycin (to inhibit toxin production) and vancomycin (to cover MRSA).
 - Adjust antibiotics based on culture results.
3. **Supportive Care:**
 - Intravenous fluids and vasopressors to manage hypotension.
 - Oxygen and mechanical ventilation if needed for respiratory distress.
 - Dialysis for renal failure.
4. **Removal of Source:**
 - Remove any foreign material (e.g., tampons, nasal packing).
 - Drainage of any infected wounds.

■ Prevention:

- Educate on proper tampon use: frequent changing, avoiding high-absorbency tampons.
- Proper wound care and hygiene.
- Prompt treatment of skin infections and surgical wounds.

TSS can progress rapidly and requires a high index of suspicion for early diagnosis and treatment to reduce morbidity and mortality.

Scenario (1)

A 30-year-old man presents to the Emergency Department with a sudden onset of high fever, severe headache, and a widespread rash. He reports feeling extremely unwell for the past 24 hours, accompanied by nausea and vomiting. On examination, his temperature is 39.8°C, heart rate is 130 beats per minute, blood pressure is 85/55 mmHg, and he appears disoriented. There is a diffuse erythematous rash, and laboratory tests reveal leucocytosis. His partner mentions that he has been using nasal packing for a nosebleed for the past two days. What is the most likely diagnosis?

Options:

- A. Systemic lupus erythematosus.
- B. Staphylococcal scalded skin syndrome.
- C. Dengue fever.

D. Meningococcal septicemia.

E. Toxic shock syndrome.

Answer: → E. Toxic shock syndrome.

Explanation:

The presentation of high fever, severe headache, widespread erythematous rash, hypotension (blood pressure of 85/55 mmHg), disorientation, and leukocytosis, in the context of recent use of nasal packing, is highly suggestive of Toxic Shock Syndrome (TSS).

Key Points:

- **Sudden Onset and Symptoms:** The sudden onset of high fever, severe headache, nausea, vomiting, and diffuse erythematous rash are characteristic of TSS.
- **Hypotension and Disorientation:** The hypotension and disorientation indicate a severe systemic response, which is common in TSS.
- **Nasal Packing:** The use of nasal packing is a significant clue, as TSS can be associated with nasal packing, similar to the association with tampon use in women.

Other Options Considered:

A. Systemic lupus erythematosus (SLE): Can present with a wide range of symptoms including rash and systemic involvement, but the acute and severe presentation with high fever and hypotension is less typical for SLE.

B. Staphylococcal scalded skin syndrome: Typically affects infants and young children, characterized by widespread erythema and skin peeling but not commonly associated with nasal packing and hypotension in adults.

C. Dengue fever: Usually presents with high fever, severe headache, retro-orbital pain, myalgia, arthralgia, and a maculopapular rash, but not typically with hypotension and nasal packing association.

D. Meningococcal septicemia: Typically presents with fever, petechial or purpuric rash, and signs of septicemia. The rash in TSS is different (erythematous and diffuse).

Given the clinical presentation and context, Toxic Shock Syndrome is the most likely diagnosis.

Scenario (2)

A 28-year-old woman presents to the Emergency Department with a sudden onset of high fever, vomiting, diarrhea, and a diffuse rash. She reports feeling generally unwell for the past 24 hours. On examination, her temperature is 39.7°C, heart rate is 125 beats per minute, blood pressure is 88/58 mmHg, and she appears confused. There is a widespread erythematous rash, including desquamation on the palms and soles. Her menstrual period began two days ago, and she has been using tampons. Laboratory tests reveal leukocytosis. What is the most likely diagnosis?

Options:

- A. Dengue fever.
- B. Staphylococcal scalded skin syndrome.
- C. Meningococcal septicemia.
- D. Toxic shock syndrome.
- E. Systemic lupus erythematosus.

Answer: → **D. Toxic shock syndrome.**

Explanation:

The combination of sudden high fever, hypotension, diffuse erythematous rash with desquamation, confusion, and recent tampon use is highly indicative of Toxic Shock Syndrome (TSS).

Next Step in Management:

Immediate Actions → Amit:

- **Remove the Source:** Remove the tampon immediately to eliminate the source of the toxin.
- **Administer Intravenous Fluids:** Start aggressive IV fluid resuscitation to manage hypotension.
- **Antibiotic Therapy:** Initiate broad-spectrum antibiotics empirically. Typical choices include clindamycin and vancomycin.

- **Supportive Care:** Provide supportive care, including oxygen therapy and vasopressors if needed, to stabilize the patient.
- **Monitor and Support Organ Function:** Continuous monitoring of vital signs and organ function, including renal and hepatic function, is essential.

Summary:

The next step in management involves admission, immediate removal of the tampon, aggressive IV fluid resuscitation, initiation of broad-spectrum antibiotics, and providing supportive care to stabilize the patient's condition.

Key
142

Pediatric Pain Management (e.g., Burn or Bone Fracture)

Mild Pain:

- **NSAIDs (e.g., Ibuprofen) and Paracetamol:**
 - Used for mild pain.
 - Can be used alone or combined with other medications for moderate pain relief.

Moderate to Severe Pain:

- **If IV Access is Not Available:** → **Intranasal Fentanyl or Diamorphine:**
 - Ideal for rapid and effective pain relief. Non-invasive and first-line option for distressed children when IV access is not available or delayed.

- **If IV Access is Available:** → **Intravenous Opioids (e.g., Morphine):**
 - Recommended for controlled, immediate pain relief in severe cases when IV access is available.

General Guidelines:

- **Opioids (Fentanyl, Morphine, Diamorphine):**
 - Used for moderate to severe pain management.
 - **Oral codeine should be avoided in children under 12** years of age due to the risk of respiratory depression.
- **NSAIDs Combined with Opioids:**
 - For severe pain, NSAIDs may be combined with opioids to enhance analgesic effects.

Scenario:

A 7-year-old boy is brought to the Emergency Department after sustaining a partial-thickness burn on his left arm from hot water. The burn covers approximately 6% of his total body surface area. He is in significant distress, crying and reporting severe pain. His vital signs are stable, and IV access has not

yet been established. The child is anxious, and the medical team is looking for the most effective and least invasive way to relieve his pain quickly.

Which of the following is the most appropriate initial management for his pain?

- A) Oral ibuprofen.
- B) Oral codeine.
- C) Intranasal fentanyl.
- D) Intramuscular morphine.
- E) Oral paracetamol.

Answer:

C) Intranasal fentanyl.

In this case, intranasal fentanyl is preferred because it provides rapid, non-invasive pain relief, which is particularly beneficial when IV access is not available, and the child is in significant distress.

Key
143

Acute Dystonia Summary

- **Definition:** Acute dystonia is a movement disorder characterized by sudden, involuntary muscle contractions. These contractions primarily affect the face, neck, and trunk and can lead to abnormal postures.
- **Causes:** Most often triggered by certain medications, particularly **antipsychotics** (e.g., **haloperidol**, **risperidone**, **chlorpromazine**) and **antiemetics** (e.g., **metoclopramide**).
- **Symptoms:**
 - Symptoms usually develop shortly after starting medication, with the majority (around 90%) appearing within the first five days of treatment.
 - The muscle contractions are painful and can cause significant discomfort and functional difficulties.
- **Differential Diagnosis:**
 - Acute dystonia can sometimes be mistaken for tetanus; therefore, checking for **hypocalcemia** is important to rule out other conditions.
- **Management:**

- **First-line treatment → Anticholinergic agents** (such as IV or IM **procyclidine**). These agents provide quick relief from symptoms, usually within 5 minutes (IV) or 20 minutes (IM) of administration.

In addition to **procyclidine**, other anticholinergic agents that can be used to treat **acute dystonia** include:

- **Benztropine** (commonly used for drug-induced movement disorders)
- **Trihexyphenidyl**
- **Second-line treatment: Benzodiazepines** (e.g., IV diazepam) are used in cases where dystonia is resistant to the initial treatment.

Scenario:

A 30-year-old woman, 26 weeks pregnant, arrives at the Emergency Department with complaints of nausea and persistent vomiting. She was previously prescribed metoclopramide 10 mg three times a day. After taking the second dose, she started experiencing involuntary muscle spasms and abnormal posturing of her face and neck. **Which of the following is the most appropriate medication to treat her condition?**

A) Botulinum toxin.

- B) Vitamin B6.
- C) Baclofen.
- D) Dantrolene.
- E) Procyclidine.

In this case, the correct answer is **E) Procyclidine**.

Key
144

Cocaine Toxicity (Overdose)

- **Manifestations**: Cocaine overdose results in **sympathomimetic effects** such as agitation, tachycardia, and hypertension due to excessive catecholamine release. Others: hyperthermia, dilated pupils.
- **First-line treatment** → **Benzodiazepines** (e.g., diazepam, lorazepam) are used to control agitation, anxiety, hypertension, and tachycardia by reducing sympathetic nervous system activity.

- **Hypertension management:**

- **Benzodiazepines** are often sufficient to control hypertension.
- If hypertension persists, use **nitrates** (GTN infusion) or **phentolamine**.

- **Avoid beta-blockers:**

- Beta-blockers are contraindicated due to the risk of unopposed alpha-adrenergic stimulation, which can lead to coronary vasospasm and worsen hypertension.

Key 145	Hypothermia Overview
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- Hypothermia is a critical medical condition that occurs when the body loses heat faster than it can generate, leading to a core body temperature [below 35°C](#).
- It is typically caused by extended exposure to cold environments, inadequate clothing, wet conditions, cold water immersion, or a reduced ability to regulate body temperature due to factors like age, illness, or substance abuse.

	<ul style="list-style-type: none">• In severe hypothermia, symptoms can include stiffness, a drop in vital signs, and even coma. <p>Management:</p> <ul style="list-style-type: none">• Rewarming: Using warm blankets and heat lamps.• Warm intravenous fluids: Administering heated IV fluids (eg, normal) saline to stabilize body temperature.